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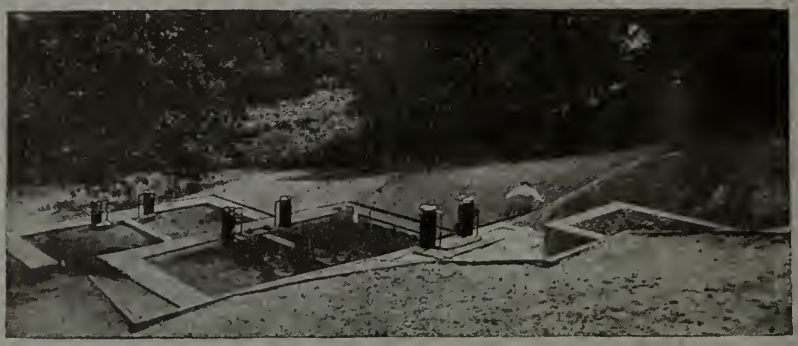

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OF

THE ROYAL SANITARY INSTITUTE

The Control of Tuberculosis as practised in the County Town of Lewes,

by J. R. STEINHAEUSER, M.D., D.P.H., Medical Officer of Health, Lewes.

Read at Sessional Meeting, Lewes, October 4th, 1912.

ON first entering practice after leaving the hospital, I was much impressed by the difficulty experienced by consumptive patients of the poorer class in gaining admission to a sanatorium. I constantly saw early cases declining into the advanced stages of the disease in their unsuitable homes, for the reason that they could not get letters of admission to a sanatorium, or that, what was worse because more tantalising, after obtaining a letter they had to wait many weeks or even months for a vacancy, during which time they perhaps became too ill to be received at the sanatorium in question.

Moreover, although sanatoria were becoming more numerous, the poorer class of consumptive's case for institutional treatment had become harder, because the general hospitals, becoming alarmed on account of the now recognised danger of infection, were refusing to admit any but sufferers from urgent complications of the disease. Twenty years ago it was usual to see in any medical ward of a general hospital two or three cases of ordinary more or less advanced cases of phthisis; to-day you will probably not see one.

In 1905, therefore, I enlisted the sympathy of the Lewes Town Council and of residents in the neighbourhood interested in the prevention and treatment of the disease. Practical sympathy was given; in the case of the Town Council, by granting me license to use their hitherto unused smallpox hospital as a sanatorium; the residents (especially one family) by donations and by their time. A committee was formed and a scheme

NOTE.—The Proceedings of the Congress at York will be continued in No. 12.

inaugurated. The smallpox hospital is in a disused chalk-pit on the Downs about half a mile north of Lewes. Local circumstances had necessitated its facing east, an unfortunate position. Still, the site is a most bracing one, and, at all events, the building is sheltered from strong south-west gales. The building consisted of two wards, holding four patients each, separated from each other by a nurses' room and kitchen. Through the kindness of the Town Council, water was carted from the Water Company's mains.

It was thought impossible to treat patients of both sexes with such limited accommodation; accordingly we decided to admit males only. It was also decided that those admitted should be residents of Lewes and the neighbourhood, whose physical condition was such as was likely to be definitely improved by sanatorium treatment.

At first our finances and considerations of climate induced us to keep the place open only during the summer months. The patient was asked to pay 10s. 6d. weekly, the rest of the cost of maintenance was met by voluntary subscriptions, the total cost per head being 30s. weekly.

This condition of affairs lasted till 1910, when the sanatorium committee felt that the usefulness of the sanatorium was much curtailed by its closure in the winter, and realised at the same time that their finances could not stand the strain of maintaining patients all the year round.

An expert on tuberculosis and sanatoria was invited, and kindly consented to give his opinion as to the suitability of the site and building for winter. His approval, with certain suggestions as to additions in the building, was given. The committee then approached the Lewes Town Council with a view to securing their co-operation in the extended scheme. This was readily given. The Town Council decided to make the building more weather-proof and comfortable; thus, a new and excellent kitchen was built, a reservoir for receiving rain-water provided, and a pavement laid in front of and all round the building. The Town Council also decided to pay 19s. 6d. weekly for any patient approved of and sent by them from the borough.

Encouraged by the sympathy of the Lewes Town Council, the Sanatorium Committee next approached the authorities of three adjoining districts. These all agreed to pay for patients on the same terms as the Lewes Town Council.

The efficiency and comfort of the sanatorium have recently been added to by the generous gift from a Lewes resident and his wife of a revolving shelter and a detached room for the matron.

So that during the last two years the sanatorium has been open all the

year round, and we are now in a better financial position, and more efficient, than we have ever been.

One hundred cases have been treated from Lewes and the neighbourhood (for it must be understood that the incidence of phthisis in Lewes is no higher than in other country towns), and we can probably shew as good results as other sanatoria. Patients are treated on the usual lines, and tuberculin is used in suitable cases. The cases dealt with are males who have early or chronic, not advanced, phthisis.

With regard to other phthisical persons, the Town Council are now sending suitable cases of women and children to sanatoria at Ramsgate and East Liss. Advanced cases of both sexes, who are eligible, and whose home conditions are unsuitable, both as regards treatment and prevention of the disease, are strongly advised (often successfully) to apply to the Guardians, at whose infirmary at Chailey, provision is made for open-air treatment.

Disinfection of rooms and bedding by means of sulphur dioxide, formalin spray, and steam is always scrupulously practised, and the cleansing of rooms and furniture is urged, after the removal of a phthisical patient from his home.

So far as possible contacts are watched and referred to their medical attendant for examination. The same policy is pursued in the case of children coming up for medical inspection whose history, present condition and environment are suggestive of the development of phthisis in later life.

I should like briefly to consider two general points closely connected with the subject. The first is the necessity for actual sanatoria or hospitals in dealing with the disease. Some writers consider that the results of sanatorium treatment do not justify the cost. Anyone who has seen the progress of a case of a poor consumptive in his own home will agree that successful treatment there is in most instances impossible, and that the advanced consumptive in such a home is a very real source of infection to others living in the same house. Institutional treatment is necessary for the large proportion of cases of phthisis amongst the poor.

The second point is the outlook on the future as to the incidence of tuberculosis. There are many factors for good.

1. The legislature are evidently united in a determined effort to rid the country of the disease. Large sums of money are to be devoted to sanatorium benefit, and it is probable that not only the insured but all persons suffering from tuberculosis will ultimately share in the benefit.

2. The educated section of the community has for long shewn its very practical sympathy with schemes for the preventive treatment of

the disease, while the sanitary conscience of the poorer class is gradually awakening.

3. The housing of the latter class has been much improved of late (in the towns especially), as also the general sanitary condition of factories and workshops.

4. We have the system of medical inspection of elementary school children, whereby the first appearance of the disease may be recognised and probably checked.

5. The sale of tuberculous food is much restricted, and the milk supply is purer.

6. We have, moreover, infinitely better methods of recognising the disease in the early stages, and with the aid of the sanatorium benefit better facilities for treating it.

The mortality from tuberculosis has been steadily decreasing during the last forty years, and in consideration of these six factors, with the increased means, we may confidently look forward to a time in the not very distant future when tuberculosis in this country will be as rare as leprosy.

His Worship the Mayor of Lewes (Dr. Hugh Stott) spoke in appreciative terms of Dr. Steinhaeuser's great interest in the subject before them, and said he had made a determined effort to do something long before the matter was being made practically compulsory, and the Town Council rendered him practical assistance. They knew consumption was more prevalent among females than males, but it was absolutely necessary to take into consideration the principal bread winner of the family, and so at the Lewes Sanatorium, with its limited accommodation, they only treated male patients. The dispensary treatment had not been carried out to any great extent, and he should like to ask Dr. Steinhaeuser if in the future he could bring up some simple scheme, if it was not provided by the county, to enable patients suffering from tuberculosis to be treated with tuberculin. The injection of tuberculin, he added, seemed to have a beneficial effect.

Dr. Duncan Forbes (Brighton) contrasted the old with the more recent methods of treatment. He emphasised the importance of the proper staffing of sanatoria. The case of each patient should receive daily consideration, so that rest and exercise might be properly regulated. He spoke hopefully of the treatment of consumptives with the exotoxin group of tuberculins.

Dr. A. A. Martin (Eastbourne) endorsed the views that it was essential to commence treatment of phthisis cases early, and suggested stringent regulations for the sale of perishable food-stuffs in the small shops in the poorer quarters of the towns, so as to prevent, as far as possible, handling of food-stuffs by persons already victims of the disease.

Dr. C. W. Hutt (Brighton) thought that the question of tuberculosis among school children was not always viewed from a practical standpoint.

They knew that a very large proportion of post-mortems of adults revealed lesions of a tuberculous nature, but it might be asserted with a considerable degree of truth that these lesions were not the cause of death and did not contribute towards the cause of death, or even, in a very large proportion of the cases, give rise to any serious illness as far as could be ascertained. The cases they wanted to discover and deal with were those in which the tubercle bacillus was the cause of an illness either definite or indefinite; or, in other words, they were from the practical point of view only concerned with clinical cases of tuberculosis.

As regarded the diagnosis of pulmonary tuberculosis in children, the physical signs were often so indefinite and possibly so transitory that means other than the stethoscope were required to help them in the diagnosis. Van Pirquet's reaction was simple and quite harmless; and facilities should be afforded to school medical officers for using it in doubtful cases. A negative result excluded the diagnosis of tuberculosis. A stringent selection of cases giving a positive result could be made, and those cases carefully watched so as to select those which were clinically tuberculous; adverse circumstances should be combated by the provision of meals (if the parents' pecuniary circumstances warranted it) and instruction in open-air schools.

The diagnosis of surgical tuberculosis, however, was relatively simple, although enlarged glands at times might be considered to be tuberculous in nature when they were only the consequence of the presence of adenoids.

It used to be held that pulmonary tuberculosis was essentially a disease of young adults; nowadays, the view had come into fashion that infection of the mesenteric glands through the alimentary tract occurred in infants as the result of drinking tuberculous milk, and the disease subsequently extended to the lungs. This, taken in conjunction with the considerable extent of surgical tuberculosis among children, which many authorities consider to be caused by the bovine form of the bacillus, pointed to the utmost importance of a milk supply free from tubercle bacilli.

Dr. G. Finch (East Sussex C.C.) said in his experience pulmonary tuberculosis was not common in children. The conditions under which medical inspection was carried out in county schools made the detection of early cases a very difficult matter, and routine inspection was not the means of bringing many such cases to light. More good might probably be done in attacking pulmonary tuberculosis in children by such methods as attending to the child's food (especially the milk supply), proper housing and hygienic surroundings, than in trying to deal successfully with cases which had developed physical signs which could be found on medical inspection.

A description of the New Sewerage Scheme for Lewes, with special reference to the discharge of Effluents into Tidal Streams, by D. Roberts, Borough Surveyor, Lewes.

Read at Sessional Meeting, Lewes, October 4th, 1912.

LEWES, a very ancient town, being the county town of Sussex, is about eight miles from the sea coast, and about fifty miles from London. The greater part of the borough is upon a ridge and sloping sides of chalk running in an easterly direction from St. Anne's and the neighbouring South Downs into the valley of the tidal river Ouse. On the opposite side of the river is the low-lying portion of the borough approached by the Lewes Bridge, and known as the Cliffe District. It lies on an alluvial flat, which is bounded on the east by the Cliffe Hill. On the south of the town, and parallel with the borough, is the Southover District, the locality known as the Wallands on the northern side occupies an elevated site.

The borough was incorporated in June, 1881, and has an area of 1,024 acres, with a population of about 11,500, and road mileage 15 miles 3 fur.

Lewes was a town of considerable importance in former days, owing to its castle and fortifications; at the present time it is principally a residential district, a market centre, and has some very important industries, the principal being a large iron foundry (the Phœnix Iron Works), which employs a large number of employees, the Lewes Portland Cement Co.'s Works, several breweries, and some very important printing works.

Only a portion of the borough was drained before the incorporation in 1881, but since that time the whole of the borough has been sewered, in sections. In 1891 the late Mr. Arthur Holt, Borough Surveyor, prepared a scheme of drainage for the whole of the borough, and in that work he was assisted by Messrs. Brierley & Holt, the engineers for the scheme now in course of construction. That scheme was never carried out as a whole, but from time to time sections of it have been completed, practically on the lines as laid down at that time. In 1888 St. Anne's district was sewered by the late Mr. Holt; in 1893 the Paddock Valley, and in 1895 Southover district were sewered by the late Mr. T. W. Franks, the then Borough Surveyor.

In 1903 the Cliffe was sewered by myself. The work in this district was in most treacherous ground, chiefly alluvial deposit and waterlogged. Under this system the sewage is discharged into the river by means of two 100-gallons capacity Shone's ejectors, the compressors for these ejectors

being driven by automatic electrical machinery, erected to pump a daily dry-weather flow of 60,000 gallons.

The sewering of the Wallands district was carried out part under Section 150 of the Public Health Act, 1875, and part by the owners when laying out the estate. There are three roads on the Wallands estate drained under the separate system; the Cliffe district is also on the separate system, the old culverts being utilised for surface water drainage. No other part of the borough is similarly drained.

The whole of the sewers in the borough now discharge into the river Ouse at five different points, the highest one being at the Corporation Yard, and the lowest at the point of discharge from the Cliffe ejectors, a distance of about 900 yards. It is proposed in the new scheme to pick up the sewage discharging at those points and convey the whole to the proposed sewage works at Southerham, on the southern side of the borough, the effluent to be discharged at one point only into the river Ouse, adjoining the site of the works.

Description of the Proposed New Scheme.

The proposed scheme of sewerage and sewage disposal has been designed and is being carried out by Messrs. Brierley, Holt & Co., engineers of Blackburn, and the work, commenced in the spring of this year, comprises the main outfall sewer from Pinwell on the northern side of Lewes Station to the works at Southerham.

The new scheme provides for the interception of the existing main contributory sewers, the construction of high and low level intercepting and outfall sewer, sewage disposal and outfall works at Southerham, the erection of pumping plant at Pinwell to deal with the low-level system, and the construction of several new tributary sewers.

High-Level Intercepting Sewers.

It is proposed to construct a high-level intercepting sewer from Pinwell Pumping Station to the Free Library, from thence skirting the eastern and northern sides of St. John's to the Wallands Park district; this sewer will be of cast iron, 18 in. in diameter at the lower end, and 15 in. in diameter in the upper portion. The sewage from the Wallands Park district and a portion of the St. Anne's district will be connected to the above with two short lengths of 6 in. iron pressure mains; these two districts now discharge into the Paddock Valley sewer, which is in the low-level area.

Low-level Intercepting Sewer.

A low-level intercepting sewer of 9 in. cast-iron pipes will be laid from Pinwell alongside the high-level sewer to the Free Library, then round the lowest portion of the north-eastern side of St. John's to a point near to the Corporation Wharf. This will intercept the sewage from the Paddock Valley district, which now discharges into the river at the Corporation Wharf. Another low-level intercepting sewer will branch away in the opposite direction to the last-mentioned sewer from Pinwell to the end of the Winterbourne Valley sewer. This will intercept the sewage now discharging into the Winterbourne stream.

Cliffe District.

The sewage from the Cliffe district will be discharged into the high-level system near to the Free Library by laying a 6 in. cast-iron pipe from the ejector, along South Street and Cliffe High Street, and over the river Ouse alongside the bridge.

Pumping Plant.

A small pumping station will be erected on land acquired for the purpose on Pinwell Road, adjoining the Lewes Railway Station, the sewage from the low-level sewer being lifted through a 15 in. cast-iron pipe into the high level sewer adjoining by means of three sets of centrifugal pumps driven by electric motors. The motors will be automatically controlled by floats so arranged as to be switched on and off according to the flow. These sets of pumps will be capable of raising 5,000, 35,000, and 40,000 gallons per hour respectively; one of the larger sets will be a stand-by. A screen will be constructed in the pump well to arrest flocculent matter.

Main Outfall Sewer.

The construction of the main outfall sewer of 18 in. cast-iron pipes is nearing completion. This crosses the main and branch lines of railway near the Lewes Station, and in part is in the nature of a syphon, access for inspection being provided at each manhole.

Sewage Disposal Works.

The works will comprise six storage tanks, 60 ft. by 30 ft. by 7 ft. deep with a total capacity for 472,500 gallons, with dividing wells at inlet for dividing ordinary flow and storm water; screening tanks in duplicate, a top, bottom, and sump sludge pit with small pumping plant in duplicate, worked with oil engine and centrifugal pumps; and four sludge drying beds. The main effluent outfall drain will be of 21 in. iron pipes fitted with tidal flaps. An employee's cottage will be erected near the works.

Statistics.

	High level.	Low level.	Total.
Present population (approximate)	8,640	3,360	12,000
Population provided for (sewers)	10,800	4,200	15,000
Number of houses (approximate)	1,768	855	2,623
D.W.F. (30 gallons per head per 24 hours by 12,000) ...	259,200	100,800	360,000
Quantity to be dealt with at works per 24 hours (D.W.F. by 6)	...	...	2,160,000
Quantity to be dealt with at works per 12 hours or 1 tide	...	...	1,080,000
Quantity to be dealt with at works per hour	...	...	90,000
Capacity (storage) in gallons (6 tanks)	...	...	472,500
Quantity to be stored per tide ...	...	...	450,000

The Effluent Discharge into the Tidal River Ouse.

The sewage will gravitate from a rising well to a screening chamber, in which will be an inclined screen of special taper steel bars to arrest solid matter and floating refuse; heavier matter, such as road grit and detritus, will be arrested and deposited at the bottom. The sewage will then pass to a dividing well where the flow will be divided into ordinary flow and storm water, and dealt with in the storage tanks accordingly. The flow to be provided for is up to three times the dry-weather flow, or 1,080,000 gallons per twenty-four hours treated as sewage proper, and the remaining volume of 1,080,000 gallons per twenty-four hours treated as storm water.

Two sets of storage tanks are provided of the dimensions already given. The first series are of sufficient capacity to allow for the sewage being stored for about five hours. The tanks are so designed that the inclination at the bottom thereof is away from the river and towards the sludge pits, which will allow all sedimentation to flow back in the form of sludge and to be treated in beds of special design. In addition to these tanks another group will be provided to be filled by an overflow passing over a weir the whole length of the end of the tanks, 30 feet. In these secondary reservoirs (which might be known as tidal storage receptacles) the effluent will be retained until one hour after high tide, when, by a system of penstocks (possibly automatically controlled), the contents will be discharged on the ebbing tide. The outfall into the river Ouse is of 21 inch iron pipes, about two feet below low-water level. This outfall

pipe will be laid at an acute angle with the river and will discharge down stream with the ebbing tide, at one of the widest points of the river. It is obvious that what with the screening, the sedimentation in the first tanks, and the considerable amount of precipitation that will take place in the tidal storage reservoirs, the condition of the effluent as it passes into the river should leave little to be desired.

The tide in the river Ouse flows for a period of three hours and is nine hours on the ebb. The effluent discharge will commence one hour after high water and cease one hour before low water.

The point of discharge into the river is about 7¼ miles from the sea and about one mile below Lewes Bridge. The tide-levels near the point of discharge are high water, ordinary spring tides, 10.52 feet above O.D.; high water, ordinary neap tides, 6.12; low water, neap tides, 0.42; low water, spring tides, 0.37.

In September and October, 1904, I gauged the flow of the river Ouse, near the discharge from the Cliffe ejectors (about half a mile above the proposed effluent discharge) with the following results:—A spring tide flowing for two hours fifty-five minutes, with high water mark at 10 ft. above O.D., approximated to 45 million gallons, showing a pollution of one gallon of sewage to about 250 gallons of tidal water. A neap tide flowing two hours fifty-eight minutes, with high water at 6 ft. above O.D., approximated to 20 million gallons, or a pollution of about one gallon of sewage to about 110 gallons of tidal water. The fresh water coming down the stream was also gauged at Hamsey Lock (about 1½ miles above Lewes) approximated to 17 million gallons per day, so that on the ebbing tide there is a further dilution.

The tidal portion of the river Ouse extends about thirteen miles from the sea to Barcombe Mills, and it is navigable throughout for commercial purposes, chiefly up to Lewes, and the up river stretch is navigable for pleasure (boating and fishing).

It is a difficult matter to draw comparisons between one tidal stream and another into which sewage is discharged, as the circumstances are ever varying, and every case must always be judged by results.

For years past the crude sewage of Lewes has been discharged into the tidal Ouse, at all states of the tide, in the centre of the town, and the nuisance resulting has been only apparent, due to the solids and flocculent matter floating about and the discoloration near the points of discharge. The large volume of tidal and river water has always rendered the sewage innocuous. It is therefore obvious that with a better effluent discharged into the river at one point only, that one at least a mile nearer

the sea, and on the ebb tide, there must be a considerable improvement as compared with the conditions now existing.

MR. A. J. MARTIN (Westminster) said that, so far as one could judge, the scheme described by Mr. Roberts had been designed with every regard to the special requirements of the area to be dealt with. The perfection of a scheme of that character depended, of course, very much on details, and in the absence of the latter one was unable to criticise the scheme, or to say how far it met the needs of the district; generally speaking, however, it seemed most suitable. He noticed that a very considerable length of sewer was in cast iron, and that there was no mention of any other material. He supposed that was explained by the very treacherous nature of the ground. An interesting feature of the scheme was the use of high-level intercepting sewers to bring as much sewage as possible to the outfall by gravitation and avoid excessive pumping; but the most important point was the method of disposal. At present they were turning an unfiltered effluent into the river, and the question which had to be decided was whether an expenditure of some thousands of pounds on a system of filtration was called for. One could not, of course, pronounce an opinion on a matter of that kind without a personal inspection of the river, but on the face of it he was inclined to think they were right in what they did. The method they had adopted, namely, that of discharging the sewage into a large volume of fully oxygenated water, was an effective and scientific method of disposal. With regard to the dilution figures, these seemed to be based on the assumption that the whole of the sewage left the estuary at every tide, and it involved the further assumption that the $7\frac{1}{4}$ miles of estuary were traversed in five hours, or at an average rate of $2\frac{1}{4}$ ft. per second. Unless that velocity were actually attained one would not get the sewage clear of the river before the tide turned, and if that were not done the dilution would not be as great as was shown by these figures.

ALDERMAN J. H. EVERY (Lewes), as chairman of the sub-committee dealing with the question of sewage disposal at Lewes, gave a short epitome of the various stages through which the question had passed, pointing out that in the early days the old governing body (the Commissioners of the Borough of Lewes, who preceded the Corporation) went into the matter over forty years ago, and had plans prepared for a new outfall to convey the sewage well below the town of Lewes. Curiously enough, although those plans had been put away and were not referred to by the present engineers, the new route adopted accorded almost exactly with that set forth in the previous scheme.

He explained many of the difficulties that had to be faced in the way of a route for the main outfall and other matters, and mentioned the fact that in all probability within less than a month one portion of the new scheme would be

completed. Incidentally he alluded to the inadvisability of the local authorities dealing with the question of sewering of a town in a piecemeal fashion, and how years ago those in authority, thinking to postpone the cost of the main works as long as possible, dealt with the draining of the outlying portions of the town, which they hoped and believed would eventually work into one harmonious whole. That was now proved not to be the case, and extra expenses were incurred.

Mr. J. H. Blizard (Southampton) differed from Mr. Martin. He thought that "the course that had been adopted for the final disposal of sewage at Lewes into the river was a right one"; it was absolutely wrong. He had been responsible for the discharge of sewage from several sea outfalls, and he was now very sorry for it; and if he had his time over again with the same work, he would certainly advocate purification before final discharge into the river or sea, because of the serious aspect of the fishery question.

In the present case the point of discharge was about seven miles from the sea, and it was an open question how far the effluent would flow down the river, and whether it actually left the mouth. His opinion was it would not, as the effluent discharge was one hour before the completion of the ebb tide, and it was impossible for it in that hour to get to the mouth of the river.

The so-called effluent was not a purified effluent; it was simply the result of natural deposition in some tanks, and then to flow into the river. The sewage would be broken up into small particles in suspension which must get into the river, as no screen was fine enough to take it.

He ventured to suggest that Mr. Roberts had not given sufficient information with regard to the levels of extraordinary high tides, and also to what extent there was flooding; neither did he give any information as to float observations before the scheme was finally decided upon.

He would also like to know whether it was a wet time or a dry time when the gaugings were taken in 1904 to ascertain the volumes referred to.

One paragraph of the paper referred to the final report of the Royal Commission on Sewage Disposal, expressing the opinion that there might soon be some data arrived at or standard fixed governing the extent to which sedimented sewage may be discharged into tidal streams and rivers.

He was not a prophet, but he predicted that Lewes would have to purify its sewage when the final report was issued. He was surprised that the Local Government Board should have sanctioned such a scheme, and he considered it would be in the best interests of the town if they boldly took the work of purification in hand at once, instead of being compelled to do it in the future.

Mr. H. Alfred Roechling (London) said that, judging from what he had heard, he thought the case had been met by the proposed treatment at the outfall works, and as provision had been made in the scheme for further treatment, this could be put in operation when necessary.

DR. J. MCGLASHAN (Newhaven) asked if the scheme was not one merely of sedimentation? Would not the addition of some system of purification be advisable? To those who lived on the banks of the Ouse below Lewes, the matter was one of considerable importance. Typhoid fever in Lewes was almost invariably followed by the occurrence of the disease further down, especially amongst the poorer people, who were in the habit of eating shellfish which had been gathered off the banks of the river. As a matter of fact, all the typhoid which had occurred in Newhaven for the last six years had been traced to the consumption of shell-fish, and there was in his mind a strong feeling that Newhaven had to thank Lewes for all the typhoid which had occurred there during the last few years. For detailed evidence on the point, he would refer the Council to the report of Dr. Foulerton, Medical Officer of Health for the County, on the pollution of the River Ouse. He hoped that the Lewes Town Council would reconsider their position in regard to this matter, and recognise the moral responsibility which undoubtedly rested on them, for not only the health of their own townspeople, but also the health of those who lived on the banks of the river, which they contemplated turning into an open sewer. He also pointed out that the effluent, which they were told went out to sea on one tide, had seven miles to traverse before it reached the bar, and not only did it not get there in one tide, but frequently did not get out in several tides.

MR. M. S. BLAKER (Town Clerk, Lewes) said that he was born in Lewes, and had lived in it all his life. When he first remembered the town there was no system of main drainage. All schemes for the drainage of Lewes that he could remember placed the outfall sewer and outfall works at Southerham, in nearly the same position as they were under the present scheme, the first portion of which had been carried out during the past summer. He considered the sewage works under construction a proper and essential course to keep the town of Lewes abreast of the times. His experience was that the sewage, which at present discharged into the river, had been of no practical disadvantage to the town, but the effect of the present scheme when completed would be beneficial. He hoped it would be in every way a success.

MR. E. T. WELLSTED (Clerk, Newhaven U.D.C.), in reply to a question, said that Newhaven disposed of its sewage by discharge into the River Ouse, practically at the harbour mouth, and some seven miles nearer the sea than the Lewes outfall, the discharge ceasing at practically the same time before low water as it was proposed that the Lewes discharge should cease.

Housing Problems in County Areas, by Robert A. Lyster, M.D., B.Sc., D.P.H., County Medical Officer for Hampshire (fellow).

Read at Sessional Meeting, Alton, October 26th, 1912.

BEFORE discussing problems and difficulties connected with housing, I wish to refer in a very few words to the place that housing should occupy in any campaign for improving the public health. A close study of the annual reports of many medical officers of health would give the average reader the impression that bad housing conditions were responsible for nearly all the ills that human flesh is heir to. Such annual reports usually contain tables of statistics which are alleged to prove the direct relationship between housing conditions and disease and death. The compilation of such tables must represent a vast amount of labour, but, in practically every case, they are unreliable and fallacious.

For example, a favourite method of dealing with such mortalities as those among infants or due to consumption is to illustrate the manner in which such deaths occur in increasing proportion according to the increase in the unsatisfactory housing of the groups of persons concerned. Nothing could be more unscientific than a mere compilation of mortalities or case-incidences arranged according to housing conditions, and the classification of families according to housing conditions. Of course it is inevitable that in the worst housed families there will be the greatest mortality, but such mortality is not necessarily due to housing. This is one of the less important factors in the production of a high infant-mortality or in the causation of consumption. People who live in undesirable and apparently unhealthy habitations are usually forced there by circumstances owing to lack of means to pay for better accommodation. The smallness of their means usually involves an insufficient (as well as an improper) food-supply, and often a general cause of their poverty is the habit of undue consumption of alcohol. Folks who live in the worst houses are, in fact, often the victims of want, exposure, dirt, bad habits, alcohol, and ignorance, and it is reducing statistical evidence to a farce to attempt to prove that their bad health and high mortality are due to housing conditions. Such factors as food, warmth, adequate medical attention, nursing when ill, and good habits, are all of much greater importance to the health of the individual than mere housing.

Improved housing must have a sound of bitter irony to half-starved people and to those who are beginning to be incapacitated by

disease, but for whom there is no help forthcoming. To offer these people a better house is, indeed, to give them a stone when they are crying for bread. Improvements in housing are not likely to produce much effect upon such a disease as consumption, for instance, so long as a large mass of the population are perpetually underfed. One of the ironies of the present system of dealing with tuberculosis is that many of the patients now being passed into sanatoria have never had regular and sufficient food, and their only chance of being properly fed has come to them by the fact that they have been attacked by consumption.

It must not be imagined that I do not realise the great importance of improvements in housing, but there seems to be no advantage in making claims that are never likely to be fulfilled as regards the probable effects of these improvements; neither is the case really helped by attempting to support it by fallacious statistics such as I have referred to.

The vitally important questions enunciated by Prof. Karl Pearson on the subject of fallacious statistics on public health reports, at the Congress at York this year, were: "Is man the product of his environment, or the environment the product of the man?" "Do the physically and mentally inferior get lower wages, and tend to drift towards the cheaper and dirtier type of house, or does the house make the occupants physically and mentally inferior?" "If neither statement is true, then what is the quantitative measure of their relative shares in the joint result?" These questions must be answered, and can be answered by accurate investigations conducted in a scientific manner, and most people with experience in the matter will agree that environment is largely the product of the man, and that the undesirable houses or slums in towns are largely occupied by the mentally and physically inferior, who have drifted into such surroundings from all ranks of society, and who, wherever they may live, will inevitably tend to exist among degrading and unhealthy surroundings. Meanwhile, one feels compelled to protest against the absurd "statistical evidence" that is being published and quoted concerning the effects of insanitary houses, back-to-back houses, and such like, upon death and disease. Professor Pearson's opinion appears to be that "man moulds his circumstances, and not mere environment moulds the human herd."

Every author states his own opinion. The modern requirements as regards housing cannot be regarded as belonging to the essentials for a healthy existence, such as food, for instance; and we shall only be endangering our cause by making ill-founded claims of this kind. Housing belongs to those other factors which have a profound influence upon the

mental and moral development of the individual, and it is on this ground that we should take our stand when we demand a general improvement in housing conditions. On the other hand, all medical officers of health are constantly having brought to their notice houses which, from the most elementary point of view, need attention before they can be considered possible as human habitations, and it is to the problems connected with such houses that I propose to refer briefly.

The first question that arises is, "What are reasonable essentials to demand in considering any particular house?" In reply I make the following list of requirements:—

1. Windows. These should be of sufficient area to render the rooms reasonably light, and should be made to open so as to be of value as ventilators.

2. Ventilation. A room with a fireplace, and a window of satisfactory size that will open so as to make an opening of at least half its area, can usually be ventilated satisfactorily if the occupier desires ventilation.

3. Dampness. The roof must be watertight, and the walls should be provided with damp-courses, and outside protection as well in some cases. No soil should be in contact with the walls above the level of the ground floor.

4. Cleanliness. This is a responsibility shared by the occupier and the owner. The owner should keep the walls and floors sound, and the facilities for dealing with excreta and house-waste of such a character as to represent the best methods available for the district. The occupier should maintain the house in a state of cleanliness.

5. Surroundings. Houses must not be so shut in as to render it impossible for them to be lighted and ventilated satisfactorily. Such circumstances are rarely met with in practice. In the majority of instances the available means of ventilation are rarely or never used.

6. Water-supply. A suitable supply must be available within reasonable distance.

Assuming that a district council undertakes any serious inspection, there is little difficulty in finding houses and tenants that are unsatisfactory, and then the troubles begin. Some of the difficulties are as follows:—

1. *The owners.* The average owner is willing to carry out reasonable repairs if approached with tact. There are two classes of owner, however, that give great difficulty. These are (1) the poor owner, who depends entirely upon the small rents of a few cottages, and (2) the wealthy owner, who declines to do anything and is willing for the houses to be

condemned. The poor owner is very common in this county, and cases are constantly met where it seems cruel and oppressive to take vigorous action. Often the owner lives in one of the cottages in question, and is in many cases sharing the disadvantages of poverty with his tenants. A case was recently reported to me where the closure of three cottages resulted in the admission of the *three families and the owner of the cottages* into the workhouse.

Wealthy owners often declare their intention of doing nothing, and say that they have no objection to the houses being condemned. The best plan of dealing with these houses is to proceed under the nuisance clauses of the Public Health Acts, and so compel the owners to deal with the defects.

2. *The tenants.* Quite commonly the tenants in the unsatisfactory houses are such as to make one hesitate about the necessity, or even the desirability, of improving their surroundings. Experience tells us that when their present house is improved, or if they move into a better house, they will continue to live in the same filthy condition. On the other hand, one constantly meets clean healthy families living in the most unsatisfactory houses.

3. *The supply of houses.* Mere closing of houses makes matters worse instead of better, as a rule, because there are no other houses available. The families ejected either have to leave the district, or go to the workhouse, or find accommodation in houses already more than full. Everyone with experience knows that the scarcity of houses is one reason for the steady depopulation of rural areas.

The above constitute the immediate difficulties that may be met, and I suggest that ways of meeting them are as follows:—

I. The poor owner is not in a position to improve the property, but it is obviously desirable to improve rather than condemn the houses, not only because other dwellings are not available, but also because the elevation of the average class of people who live in these houses can only be a gradual and slow process. Housing authorities should have the power to purchase such property at a fair price, and to repair the same. Such powers are far more likely to be utilised than the present powers of provision of new houses, because such investments are much more likely to be remunerative.

The property of the wealthy but obstinate owner should be dealt with by using the powers under the Public Health Acts rather than the Housing Acts.

II. *The Tenants.*—Efforts should be made in every district to improve the filthy, careless, and destructive tenant who is so common in cottage

property. There is no doubt that sanitary authorities have been very lax in this respect, and have devoted much attention to the owners, while they have overlooked the fact that the tenant is really not fit for better surroundings. Notices on occupiers are rarely or never served in many sanitary districts. My own experience as a local medical officer of health has convinced me that owners of property are much more reasonable and far more willing to effect improvements if they know that every effort is being made to make the dirty and destructive tenant realise his responsibilities.

III. *The Supply of Houses.*—The supply of houses is deficient in nearly every district, for the following reasons:—

(*a*) The stringency of the local by-laws. By-laws ought to be more elastic, so as to allow something to be built that will be between the permanent and perfect structures that are the aim of the modern by-laws and the tumbledown and insanitary structures that people are compelled to inhabit for lack of anything better. The man who has saved a little money and has bought a bit of land is prevented from putting up a house that would be satisfactory for his purpose, while neither his means nor his inclinations will allow him to build a residence that will serve for his great-grandson. Such men rarely have any ambition to build for posterity, and they should not be forced to do so.

Builders also are prevented from supplying the need for more houses. The price of land and the modern by-laws combine to prevent the possibility of obtaining any return on this form of commercial enterprise.

Of course, the District Council has power to build cottages, but they are not likely to do so, because the cost of such schemes is usually out of all proportion to the small rateable value of a rural or small urban area. The result is that their natural anxiety to keep down rates overcomes their inclination to relieve the urgent need for additional houses.

Unfortunately, when the District Council decides to do nothing the matter, in practice, ends. It is true that under the Housing and Town Planning Act, 1909, the County Council has power to act if the District Council fails to do its duty, but it is unreasonable to expect any County Council to declare war in this fashion with one of its constituent areas unless things have become so bad as to become a public scandal. No doubt matters would be improved by giving the County Council concurrent powers, and by making them directly responsible for dealing with housing conditions all over their area. It is no use to expect a County Council to become involved in local quarrels with

District Councils over matters for which it has been given no definite or direct legal responsibility, but as soon as the responsibility became theirs every County Council would act. An expenditure that is a heavy burden on a parish or a District Council becomes a light and hardly noticeable charge when spread over a county area. If, in addition to giving County Councils definite responsibilities concerning housing, it was arranged for subsidies to be forthcoming from Imperial funds, some very substantial improvements in housing would soon be apparent.

At the same time it must be remembered that considerable care will be necessary in order to prevent such public provision being used for lowering wages in rural areas. In fact, it is the opinion of many experts that the provision of cheap, rate-aided cottages is simply putting back the time when the agricultural labourer will receive sufficient wages to pay a reasonable rent, and that local doles and parliamentary grants, however disguised, are mere temporary palliatives. As a medical officer of health, however, I welcome *any* method of securing increased health and happiness for that part of the population which knows little enjoyment of life, and of which death and disease are at present taking an undue toll.

[*For discussion on this paper, see page 559.*]

Municipal Work in Alton, by G. Bertram Hartfree, F.S.I., Surveyor, Alton Urban District Council (member).

Read at Sessional Meeting, Alton, October 26th, 1912.

THE area of the Urban District of Alton is 3,945 acres, which includes the town with surrounding land under development for building purposes; Beech area principally bungalow residences; and agricultural land. The rateable value is £30,768, and the rates for the present year including water amount to 6s. 6d. in the £.

The geological formation is chalk: the three varieties (upper, containing flints; middle, without flints; and the chalk marl of the lower series) occur in turn, covered to varying thicknesses on the hills by clay and in the valleys by gravel.

A Board of Health was formed in the district in 1831, and was succeeded by a Local Board in 1860. The formation of the latter body was the foundation for the present-day municipal work; at their first meeting the engagement of Mr. J. Wornham Penfold for surveying the town and making a detailed map was decided; copies of this, revised and corrected to date, are now in use, and show to a scale of 44 feet to the inch all buildings, sewers, drains, water-mains and services.

The earliest sewers were constructed in 1861, and consisted of stoneware socketed pipes, jointed with clay on the underside and left open at top; the best known patent pipes, the special point of which was the facilities they afforded for inspection in case of stoppage, were used; the patent referred to moveable caps placed over the junction of two pipes, no manholes were provided; but relying on subsoil water for sewer flushing was soon discovered to be without any advantage, and led to considerable difficulties. Under the advice of the late Mr. Lawson, C.E., in 1865 close-jointed pipes were laid, iron being used in the valley; manholes were provided at all necessary points, the original sewer remaining in position as a spring-water drain. Further extensions were made in 1890 under the direction of the late Mr. Mansergh, M.Inst.C.E. Since 1905 short extensions have been made as building development required, and in August last an extension of 2,000 yards was completed by direct labour. This consisted of 900 yards 9-in. and 220 yards 6-in. stoneware pipes; 600 yards 9-in. cast-iron pipes; and for the purpose of improving the gradient of the new sewers a length of 330 yards, formerly with a fall of 1 in 178, was relaid to a less gradient to allow a uniform inclination of

1 in 385 to 900 yards of the new sewers, the remainder of which were laid at inclinations varying from 1 in 180 to 1 in 280. Lead wool was used for jointing the iron pipes and proved invaluable, as many of the joints were made under water; all were tested internally to a pressure of 3½ lbs. to the square inch before being covered over. The work being close to the river Wey, rendering brick construction difficult, rock concrete manholes provided with iron spigots and sockets were used. Upon being lowered into position the connections were made sound with lead wool, and the ogee-shaped joints to each section of manhole ensured obtaining sound work. Those stoneware pipes laid to the 1 in 385 gradient were provided with bitumen joints to obtain a true invert. With the greater part of the stoneware construction much more water was met than was anticipated; in consequence, to minimise the risk of future inflow of water, in addition to tested cement joints the pipes were covered by a band of clay and encased in concrete, with the exception of 200 yards laid with grouted composite joints; the latter section proved the most economical. Unfortunately the estimated cost, £1,500, was exceeded by £164, caused by the abnormal quantity of water met with and lack of experience on the part of the workmen, only three of whom had previously been engaged on similar work. It has been customary in the past to arrange that all work should as far as possible be carried out departmentally in the winter to reduce unemployment, and on smaller works this has been satisfactory from all points of view.

From earliest days great trouble has been experienced from the entry of spring and surface water in the sewers. In 1874, whilst the estimated dry weather flow was 100,000 gallons, ten times that amount arrived at the works. This has been reduced considerably by laying iron sewers and separate surface water drains. On the hilly districts deep stoneware gullies were provided in place of brick catchpits, and turning chambers were substituted by silt arresting chambers; these were constructed as large catchpits, with bases two or three feet below the outlet pipes, with brickwork brought to the surface and covered by ventilating manhole covers. The quantity of silt arrested, and its absence in the pipes, has warranted the continuance of this practice. During the past year concrete built around wood drums has been used in chamber and gully construction, and whilst being stronger, it has been cheaper than brick or stoneware work.

The sewage disposal works constructed in 1861 consisted of a small precipitation tank and filter made of wrought iron framework filled with layers of flints and charcoal. With a view to improving the works, from

1874 to 1887 experiments were made with the following processes of purification: A B C, phosphate process, black ash waste and lime, lime precipitation, and porous carbon. A scheme for lime precipitation was submitted to the Local Government Board in 1887, but was not approved, a final land treatment not being included. Three years after schemes for broad irrigation and intermittent downward filtration were contemplated, but opposition on the part of owners of adjoining lands prevented their execution, and subsequently experiments were made with herring brine; ferrozone; and polarite filters. In 1890 an offer was accepted from a company who agreed to construct all buildings, appliances and filters, and purify the town sewage for the sum of £280 per annum, subject to the Board purchasing the plant at a price previously agreed upon at the end of three years, in the event of a satisfactory effluent being continued. These works, constructed in 1891, included a carboniser house in which house refuse was burned for purposes of obtaining carbon precipitation tanks and filters. The contract was terminated owing to complaint of smells and other difficulties. Endeavours were made to obtain suitable ground for land treatment outside the district, but owing to strenuous opposition on the part of adjoining landowners, without success; as temporary measures the Amines system of precipitation by brine and lime and Alumina ferric treatment were tried.

Subsequently, upon the advice of Mr. R. F. Grantham, M.Inst.C.E., a scheme for chemical precipitation with final land treatment was proposed, the precipitation was abandoned in favour of Mr. Dibdin's bacteria beds which had recently been installed at Sutton, and this met with the approval of the Local Government Board. The works included an egg-shaped tank sewer, 3 ft. by 2 ft., capable of holding 40,000 galls., screening chamber and pump well; an engine house, containing engine, pump-room, workshop and store. Hornsby Ackroyd oil engines and three-throw pumps by Messrs. Waller were provided in duplicate. From the pumping station the sewage is raised to the disposal works at the foot of Neatham Downs. Originally the screened sewage was discharged direct on the primary (coarse) beds, where after contact it flowed on the second (fine) series; the effluent passing on to land laid out in terraces, which were not underdrained, but notwithstanding, absorbed the effluent for several years. Some eight or nine years ago the beds choked, and both series were refilled with coarse material, a small detritus tank being constructed at the same time. In 1906 two anaerobic tanks, together holding $\frac{1}{3}$-day's flow, were constructed; the land has since been underdrained, and additional bacteria beds are in course of construction. The size of the

tanks was limited owing to the large proportion of brewery waste rendering longer contact inadvisable. Strict economy had to be practised in their construction, and the chalk soil was excavated to its angle of repose and lined with 9 in. brickwork, with 18 in. piers 8 feet apart at the back. Land drains consist of field pipes butted, but with cement jointed pipes at the end of each section taken above ground as air inlets. Inspection chambers are provided to each of fourteen sections of land so that effluents can easily be examined. Gallenkamp's testing apparatus is used for this purpose. The new beds for bacteria treatment are being constructed with earth walls; as filtering media, any hard clean material that can be obtained is used. Eight beds, each capable of holding 12,000 gallons, have been commenced, four of which are now in use; two are filled with broken glass, one with clinker and the fourth with flint. Although not giving as good results as clinker, the glass performs useful work and results warrant further extension on the same lines, as the cost of brick-built beds of similar size, £86 each, prevents their use, and purchased filtering media would average an additional £50. The present area of land, including buildings, beds and roads, is 14½ acres, but acquisition of more land is contemplated.

Previous to 1907, a building in the town was used as an isolation hospital. The present buildings are erected on a hill overlooking the Caker Stream, with excellent views to the south-east, and include a large pavilion containing two 6-bed wards, water-closets, bath rooms, and nurses' sitting and bed rooms, with kitchen and laundry block with caretaker's room adjoining; a small pavilion, 40 feet distant, contains one 2-bed and a 4-bed ward, with bath and nurses' room; a small discharge cabin containing disrobing, bath, and dressing rooms; there is also a mortuary on the site, which fortunately has been used but once. The buildings are constructed of timber framing, covered with galvanised iron outside, and lined with matchboard inside; on the face of this uralite has been fixed, the joints of which are covered with strips of the same material finished to give a panelled appearance. Drainage is to an anaerobic tank, the liquid from which discharges upon filters; No. 1 (open) containing one inch granite, and No. 2 (covered by perforated tiles) is filled with three-quarter inch flint; the effluent is conveyed away in closely jointed pipes until the outcrop of the middle chalk formation is passed, and discharges on agricultural land with a marl subsoil. Water supply is from the Council's waterworks; owing to the altitude of the site, a miniature high level service had to be provided. The total cost of land, buildings, sewage disposal, water supply, and fencing was £1,340. An

agreement was entered into with the Alton Rural District Council last year, by which the hospital is now controlled by a Joint Board, and by a further agreement made in August last, the Board has taken over the leasehold lands and buildings in the occupation of the Rural District Council at Medstead, to be retained as an emergency hospital.

House refuse is collected from town dwellings twice weekly; formerly it was deposited on hop lands, but the supply exceeding the demand, complaints of accumulations were received, and some five years back the provision of a 1-cell destructor was considered; but as utilising the power for sewage pumping required steam in place of the oil engines in use, and refuse cremation near the water reservoir appeared undesirable, the destructor scheme was abandoned in favour of the system in use at Farnham, and the refuse is mixed with sewage sludge, finding ready sale as manure.

Provision of a public water supply received attention in 1871: four years after the works were constructed on Windmill Hill, under the direction of Messrs. Gotto and Beesley. These consist of an engine house, containing engine room, boiler room, and coal bunker; a dwelling house for attendant; and a reservoir constructed with brick, arched and covered, having a capacity of 100,000 gallons. The well was sunk to a depth of 135 feet; owing to the supply failing to meet increased demands it was lowered a few feet in 1880, and the advisability of driving headings was considered, but ultimately boring operations were instituted to a depth of 480 feet, reaching the Upper Greensand, since when no shortage of water has been experienced. Continual observations were made during the hot summer of 1911 and throughout the supply was in excess of the demand. Considerable extensions and improvements have recently been made to the mains, and owing to the development of building sites on the hills further improvement at the works is under consideration. The draft scheme provides for increased storage; substituting gas or oil engines for those in use, preferably one of each to provide against shortage of any particular fuel; also a high-level supply, the principal power for which probably will be a wind motor capable of raising 50,000 gallons 50 feet in 24 hours. The water charges are low, a special rate of two shillings each for cottages, whilst larger dwellings pay a rate of 3d. in the pound; no extras are made in respect to baths or additional water-closets. Trade and garden supplies are metered at a charge of 6d. per thousand gallons.

The mileage of roads in the district is 37; 7 of which are main roads. The local materials suitable for road metalling are picked flints and

gravel; Guernsey granite was imported in 1903 and the use of hard material has since extended. Clee Hill basalt, Rowley rag, Moel-y-gest and Scotch basalt have since been used on the level lengths, and Mount Sorrel and Hartshill granites on the hillsides. Dust palliatives were introduced in 1906, and the results warranted further use until 1909, when surface tarring was commenced. This work has been extended yearly, including machine and hand treatment with local tar, distilled tar, and Tarvia. The costs varied from ½d. to 1¾d. per yard super, according to the material and finish; the lowest price being for local tar covered with road dust and the highest for Tarvia covered with limestone chippings. Recently lengths have been laid with tarviated granite on the Gladwell system, Rocmac sub-binder, and the following materials coated with tar previous to spreading:—Slag, Clee Hill basalt, Mendip limestone, Bargate stone and flints. All the foregoing trials have clearly demonstrated that water-binding methods are obsolete, and present-day traffic can only be combated by some form of tar or bituminous binder. Various materials consolidated to a full thickness of 3 inches, allowing 1 ton to cover 6½ yards have cost per yard:—gravel, 8½d.; flint, 1s.; Bargate rock (a Hampshire calcareous sandstone similar to Kentish rag), 1s. 6d.; Mendip granite, 1s. 7d.; Rowley rag, 2s. 6d.; Mount Sorrel granite, 2s. 7½d.; Hartshill granite, 2s. 7½d.; Clee Hill basalt, 2s. 8d.; tarred Mendip stone, 2s. 8½d.; tarred slag, 3s. Clee Hill basalt on rocmac binder, 3s. 1½d.; on tarvia binder, 3s. 1½d.; and the same material tarred to Road Board specification, 3s. 5½d. The principal roads are scavenged twice daily and others according to requirements. Private streets are repaired under the provisions of the Private Streets Works Act, the costs including kerbing, channelling, and surface drainage, have ranged from 2s. 4d. to 5s. per foot frontage.

The formation of narrow roads and cul-de-sacs in the past has drawn attention to the necessity of remedying as far as possible and in future preventing this evil, and a draft town planning scheme is in hand showing suggested improvements to existing roads and lines of proposed thoroughfares; whilst local development does not warrant an application for Government confirmation at the present time, the plans will be taken as a general guide in case of alteration, additional building or other similar matters, with a view to obtaining a general conformity of new roads and widening to those existing, at small expense to the rates.

Until September 1907, the by-laws with respect to new buildings in force were those made under the provisions of the Public Health Act, 1848. Those now in use are the series known as the Intermediate Model

By-laws, and contain a special clause for permitting the erection of galvanised iron dwellings in the rural parts of the urban district.

In the public health department, periodical house to house inspections have been made for many years. In addition to the ordinary registers, a separate record is kept of the type of closets, gullies, and water fittings at the various dwellings. The provision of flushing cisterns to water-closets was enforced in 1908; since, some 900 additional tanks have been provided. All new drains are subjected to a hydraulic or compressed air test, and wherever possible in addition a clearway test is applied to the interior of pipes to prove the existence or otherwise of obstructive joints. Whenever occasion arises, existing drainage is tested with smoke, chemicals, coloured water, or normal air pressure.

The question of provision of sufficient light and ventilation to existing cottages receives special attention. In cases of dampness; roof repairs, rendering walls with cement, and insertion of horizontal damp-proof courses are insisted on as the particular case may require. All the other matters in this department are of the usual routine character, but possibly procedure with infectious cases may be of interest. The patient being removed to hospital, or on recovery if nursed at home, in addition to the sick room, a part and more often the whole of the house is disinfected. Where it is impossible to disinfect the house in sections, as for example where but one external door exists, the council provide a cottage to which the occupants of the infected house can remove whilst their dwelling is being disinfected. Ligner's machines for generating vapourised formalin are used, these being found after years of experience with various appliances to show fewer return cases.

The provision of a pressure steam disinfector has been considered, and four or five years back a cabinet for treatment of clothes with gas generated from permanganate and formalin was constructed, but the general practice with infected goods is destruction by fire; and notwithstanding the cost of compensation, this appears the most satisfactory method, as all inspectors have experienced the difficulty of persuading a certain class of people to hand over their clothes for treatment in a steam disinfector. Generally some article of finery is held back to assist a return case.

Disinfection is also carried out after cases of tuberculosis. In addition, to further combat with this disease, the council have provided a portable cabin, suitable for erection in gardens, for loan in early cases to cottagers for open-air treatment.

[*This discussion applies also to the paper by* DR. R. LYSTER, *p. 546.*]

DR. J. F. BRISCOE (Alton) hoped the time would soon come when they would have in the Government a Minister of Health, when a medical man would sit in the Cabinet. District councils, when dealing with these housing problems, ought to insist on the minimum requirements in county areas. His experience of slums in London was that the class of people who lived in dirty houses were those who were on the downward grade of life, who were physically or mentally deficient. People of good physical and mental capacity did not live in dirty houses. It was the class who lived in these dirty houses that dragged the others down.

MR. C. G. MASON (Guildford) said he had been asked to give an account of the lead Guildford had given in dealing with the housing problem in Surrey. He agreed with Dr. Lyster's remarks with regard to the provision of ample window accommodation in cottages. In Guildford they had carried out two building schemes, in 1906 and in 1912 respectively, and those schemes were entirely a financial success. In all country towns like Guildford or Alton the question of the demolition of cottage property arose, because in old towns they found cottages long past occupation. His council had a good deal of difficulty to overcome before they could put into operation the Housing Act in Guildford, but they had carried out these two schemes to the general satisfaction. The cottages were never empty, and the voids were practically nil. A balance sheet was prepared each year, and the council were able to see that no loss was incurred. The first lot of cottages was let at various rentals, the cheapest at 5s. 6d. a week, inclusive of rates. Of course, cottages of that description were only fit for newly-married couples, but they were very pleasant. They had had to refuse at least ten applicants. He wanted to emphasise the need for a wide choice of site when a housing scheme was being carried out. They could not do better than run the houses due east and west, so as to get plenty of sun and air space at the rear of the houses. When the houses were erected he was put into competition with an architect. The consequence was that they had built the houses half of one design and half of another. The two designs, however, harmonised well.

MR. F. E. FREMANTLE (Herts County Medical Officer of Health) was glad to endorse several of Dr. Lyster's remarkable and original conclusions, at which he had also independently arrived. No figures, not even those of back-to-back houses, published by the Local Government Board, could show more than that the oldest and cheapest houses were inhabited in general by the poorest families; and that the poorest families included in general the least intelligent, the least careful, and the least resistent to disease. Doubtless the use to which the house was put was of greater sanitary importance than the structure of the house: the ill-effect of

bad housing was largely under the control of tenants themselves, and this should be impressed on the people with all earnestness, and on all occasions when housing was being discussed.

At the same time, structural conditions also had an influence on the health of the inmates, both directly and morally, especially amongst the poorest, who constituted the root problem of public health; and constant improvement should go with constant enlightenment. Improvement was needed both in condition and in number. Most houses could be made habitable by repair; but supply of new houses was a more difficult question. It must be remembered that houses, like clothes or any other article, were far more expensive when new than when the newness had worn off. All the poor could afford was a second-hand article, and when it was necessary for new houses to be provided for the poor, it was unfair to expect them to pay that part of the cost, which might be due to mere newness.

This was the basis of the demand for a State grant, which was proposed in Sir Griffith Boscawen's Housing Bill, but struck out in Committee this year. Where the lack of cheap housing was urgent, and to the extent to which the expense of newness exceeded the bare requirements of decency, stability and health, the balance should be made up either by rate, or State aid, preferably by both in equal proportion, following the precedents of the Education and Insurance Acts. Such aid would not undercut the builders, who at present only built for those who could afford to pay the whole expense of a new house, with a good margin of profit. The builder did not supply new houses for the poorest; and, if they believed in the need of supplying this want in the near future, they must find some agency with means of supplying it. They could not wait for the wages of agricultural labourers to be raised all round.

Mr. F. C. Uren (Aldershot) said Mr. Hartfree deserved the thanks of the meeting for his very comprehensive paper. The analysis of costs which he had given on page 557, relating to road work, should interest every surveyor, and considerably enhance the value of the Transactions of the Institute; but, on the other hand, it was not possible to appreciate the value of the works proposed for sewage disposal, described on page 555, as the population they served was not given, nor was there any information as to the dry-weather flow of the sewage; so that whether the proposals complied with recognised practice or the standard laid down by the Local Government Board, it was impossible to say. Then as regarded those filters having earth walls, were they used merely as streaming filters, or contact beds? If the latter, how were they filled in a porous material like earth? and why did the author depart from the very general use of clinker for the beds, which he admitted gave the best purification results?

Dr. E. W. Routley (Aldershot) agreed that insanitary houses were in themselves merely one factor, and that the intelligence and physical and mental condition of their inhabitants had also to be taken into consideration in dealing

with the housing problem. But they had very little to do with eugenics. Their duty as medical officers of health and sanitary inspectors was to administer the law as they found it. They would, however, always be allowed to offer any suggestions to improve public health and sanitary laws, but they had very little to do with root causes. In inspecting cottage property he found that 95 per cent. of the people kept their windows closed, and their fireplaces were always closed up, so that they had no ventilation. Another important thing to avoid in a house was dampness. Here again tenants were much to blame. Dr. Lyster spoke of rich owners who intimated that they would do nothing. He had never come across that class in Aldershot. With regard to the poorer owners, when they came across certain cases of hardship such as had been described by previous speakers, they made use of that blessed word "compromise," and were content with even less requirements than in other cases.

MR. W. V. ANDERSON (Winchester) said the stringency of the local by-laws was a very great difficulty in the way of providing cottages for the working classes, and they were glad to see that the Local Government Board had just issued a new set of model by-laws, which would give them a great deal of latitude in that respect. He agreed with the reasonable essentials of housing mentioned by Dr. Lyster, and if they made out their specifications on those lines they would not go far wrong. He entirely agreed with Mr. Hartfree in the mixing of house refuse and sludge.

MR. R. W. CASS (Farnham) expressed some disappointment with Dr. Lyster's paper. The mere existence of other evil factors in relation to public health did not in the least mitigate the great evil of bad and deficient housing. The attitude assumed in the paper to the cottagers of rural England was not (except in isolated cases) justifiable. History had shown how much England owed to her rural cottage life. He reminded the meeting that the cottager generally paid more in rent and rates in proportion to what he got than most people. To balance this inequality the authority might do for him a number of things, or any one of them. It might give him, subject to certain limitations: 1, free libraries; 2, bath and washhouse; 3, recreation; 4, small holdings; 5, allotments, etc.; and among them decent housing. One might reasonably put housing first, and go as far as to say that this was one of the duties of public authorities. This, so far as Farnham was concerned, could be done at the cost of about a penny on the rates. It was a fallacy to say that a charge upon the rates for housing only benefited the actual person who might be so fortunate, or unfortunate, as to occupy the dwelling so erected, as building to such an extent as to relieve the pressure and bad conditions caused by a dearth of cottages freed the hands of the local authorities, and thus enabled them to deal more effectually with insanitary dwellings, and, by lessening the demand for cottages, to somewhat reduce rents, the results of which were for the public good.

He complimented Mr. Hartfree on his paper on sanitary work in Alton, and particularly on his earth-banked filters. Good engineering and good economy was to get the best results at the minimum cost, and where walled filters were unnecessary, it was good engineering and good economy to put them in earth.

Dr. W. L. P. Bevan (Alton) had no doubt that Dr. Lyster struck the true note when he said that the housing question was not the only factor in considering the death rate. At the same time they could not hide from themselves the fact that housing had a great deal to do with the bad health of the occupants. He thought that bad foundations in a house on made soil full of organic matter and all sorts of pollution had a very deleterious effect on the health of the people who were otherwise predisposed to illness, and was a great cause of rheumatoid arthritis. In Alton they often had a difficulty in dealing with cases of overcrowding. If they were too strict in carrying out the law, they would be sending people out who could not find suitable houses elsewhere, so they had to use that valuable word compromise. He believed if the suggestion made about helping poor people to repair their houses was carried out, it would be a most valuable help to the sanitation of the town.

Mr. F. Ayles (Stockbridge) said the cost of building materials had a lot to do with the cost of a house. For a number of years he had been making a study in economising in cottage building, and he had come to the conclusion that the only solution was to standardize every particle of material to be used. He was making an experiment in the matter. He had bought $3\frac{1}{2}$ acres of land in the neighbourhood of Romsey, and he was going to build a number of houses, and would let them at a rental of 3s. per week each, and rates would work out at another 9d. The houses would be built to accommodate six or eight persons. The next few would be a shade costlier, and would accommodate the class of persons who at the present time occupied houses which were not good enough for them. He was sure if he could build houses at that rent, public authorities could do it also, because they could get money cheaper than he could. If they were going to get a State grant for authorities who built houses, it would not be fair to the people who chose to build. The people of Manchester were building 80 houses through a society. These people had put a certain amount of money into it, and it would not be fair to them if the authorities commenced building other houses in the neighbourhood with State money at a lower rate of interest than the company were getting.

Mr. H. C. Phillips (Hursley R.D.C.) said he was in favour of less stringent building by-laws for distinctly rural areas, as he knew of wooden structures (built on the bungalow fashion), on brick foundations which were to all appearance dry and healthy.

Touching upon the questions of damp, light, and overcrowding, they had dealt with damp walls by cutting through a suitable course and inserting a single slated damp-course, pointed up in cement; more window space had in several cases been provided, and fixed lights made to open. An important point akin to overcrowding was the proper separation of the sexes. Every house should have at least three bedrooms.

In his district it had been the practice for several years to serve notices, under the Public Health Act, on both owner and occupier.

Mr. Arthur J. Martin (Westminster) said of all perverse and wrong-headed proceedings perhaps the worst was to attempt to deal with the housing problem by pulling down the houses that they found. In some cases possibly this was absolutely necessary, but the vast majority of insanitary houses were capable of being put into a sanitary condition, and Dr. Lyster's suggestion that the local authority should take them over and do so was a very valuable one. He thought, however, that many local authorities would hesitate to make a large investment in property of this class, and that not a few owners would object to be dispossessed of their houses. He therefore suggested as a modification of Dr. Lyster's proposal that insanitary property which the owners themselves could not afford to put into proper condition should be taken over temporarily by the local authority, who should do what was necessary, and, after recouping themselves for their outlay out of the rents, restore the property to its owner.

Mr. T. Paterson, J.P. (chairman, Farnham U.D.C.) said at Farnham they had embarked on a scheme for building at least twenty cottages. The whole problem was one of the education of the individual, and he thought it was worth while trying to carry that out in some form or other. Unless they could do that it would be impossible to do away with slums. There were people who would rather live in slums than anywhere else, and these people ought to be educated in keeping their windows open and in keeping their houses clean, and even in matters of elementary cookery.

Councillor H. Dolman (Frimley U.D.C.) said the question of rural housing was one of the most serious they had to deal with. As a builder he had himself been spending hundreds of pounds in the improvement of houses in Camberley. Nobody but private owners knew what they had to put up with. The District Council built two houses at Camberley for the men on the sewage farm and they cost £350 the pair, and they had only been up twelve months when they had to spend £12 in internal decoration. The landlord should do his part and the tenant should also do his. Building material had gone up 20 per cent., and he defied the speaker from Romsey to build his houses to let at 3s. 6d. a week.

The Chairman (Mr. H. Percy Boulnois) said that the discussion had been of considerable interest, because the question was an extremely difficult one. The question was this: If a local authority were to build State-aided houses, where were they to draw the line? Why should Smith, who lived in a State-aided house, pay a rent which did not pay the local authority who built them, and Brown have to live in another house on which the owner had to charge a remunerative rent? They must consider the ratepayers, and the ratepayers were not all wealthy. When he was city engineer of Liverpool twenty years ago he endeavoured to build working class dwellings on the following unit, 1s. a room a week, to bring in $4\frac{1}{2}$ per cent., on land costing 12s. 6d. a square yard. They were built to suit people who would otherwise be living in pigstyes. He did not quite succeed, as the cost worked out at 1s. 3d. a room per week. He admitted they were not houses which the better class artisan would take, and in visiting them some time ago he found them inhabited by the poor Irish who lived in Liverpool. They suited that class of people and left the better houses for the better class tenants. He agreed with Dr. Lyster that housing was not everything, although some people were inclined to think so. Eugenics was of great importance.

Dr. Lyster, in reply, said it had been suggested that the owner of bad property ought to be treated in the same way as the man who sold bad food Of course, the speaker had in his mind the small shopkeeper who was prosecuted for selling adulterated milk or butter, or diseased meat. He wished to call his attention, however, to the case of the owner of a tuberculous cow whose milk was spreading disease broadcast, or of the vendor of filthy milk that was poisoning dozens of people. Those people went scot free, and if they ever got the power to seize a tuberculous cow it would only be by paying compensation. This was because the milk and dairy trade was connected with powerful vested interests, and so it was dealt with in quite a different manner from that in which it was proposed to deal with the owners of dilapidated small house property, who formed one of the weakest and least protected parts of the community. Surely the owner of an unsatisfactory house deserved at least as much consideration as the owner of a diseased cow.

In conclusion, he wished to point out that the main object of his paper was to show that in attempting to improve the conditions under which the lower classes lived, they were dealing with a profoundly complicated problem, and that the customary practice of attributing disease and high mortality entirely to unsatisfactory housing conditions was fallacious and misleading.

Mr. G. B. Hartfree, replying to Mr. Uren, stated that the sewered population of Alton was 5,000, and that the dry-weather flow, including trade sewage, but not spring water, which varied, but which it was hoped eventually to

keep out altogether, was estimated at 180,000 gallons per day, to which must be added the quantity received from a portion of the Alton rural district based on a metered water supply at 20,000 gallons per day. In the Bagshot Sands, as at Aldershot and Frimley, he agreed that earth walls could not be made watertight, but at the Alton works on the chalk marl he had made perfectly watertight walls; new walls before use had cracked in the sun, but when in daily use no leakage had occurred. On the question of filtering media he would have preferred to use clinker, but cost alone prohibited it. In regard to house refuse, it would appear that the nuisance from that substance would be intensified by the addition of sludge, but their experience showed that it was a case of two positives making a negative. Calcium chloride and akonia had been used as dust palliatives. He regretted that he could not give further particulars of the original waterworks undertakings which were completed many years ago, and he was glad to say that all waterworks loans had been paid off.

Report of the Departmental Committee of the Local Government Board on Intercepting Traps in House Drains, by H. Percy Boulnois, M.Inst.C.E., Chairman of the Council of the Institute.

Read at Sessional Meeting, London, November 12th, 1912.

THE controversy with regard to the question of intercepting traps is not new. At a sessional meeting of The Royal Sanitary Institute held in London, on February 4th, 1906, Dr. Butler, medical officer of health of Willesden, read a paper entitled "Is the Intercepting Trap a Failure?"; and Mr. Read, the city surveyor of Gloucester, followed with a short paper on the same lines. Both these gentlemen condemned the trap as a failure to secure isolation from the sewer. An interesting discussion followed, in which various opinions were expressed.

Dr. Butler evidently did not let the matter rest, for in 1908 the Willesden Urban District Council approached the Local Government Board with a proposal to adopt a series of building by-laws, in which the requirement as to the provision of an intercepting trap was to be omitted. The Local Government Board refused, but promised that an inquiry into the question should be made. A departmental committee was formed, investigations and inquiries proceeded, and after four years' work the report of this committee has been published.

The report practically condemns the intercepting trap. Our long-cherished belief in the efficacy of the trap has been rudely shaken, and it behoves us to very seriously consider this report and the conclusions at which the committee have arrived. For at least thirty years the Local Government Board has insisted on the provision of an intercepting trap, and proper air circulation, in all by-laws relating to house drainage; and it will be interesting to see what line will now be taken by the Board in view of this report from a committee of its own officials.

The members of the committee are all personally known to me, and are all highly experienced in their respective professions. The report has taken four years to produce, and bears evidence of the extreme care and labour with which the investigations were made, and the manner in which the conclusions were arrived at.

We shall all of us agree, whatever our opinions may be on the merits or demerits of the intercepting trap, in thanking the committee for their labours, and for their very interesting and valuable report.

I will endeavour to deal with the various indictments which are raised

in the report against the use of the intercepting trap, and the conclusions at which the committee have arrived in each case.

1. As the trap forms an obstacle to the passage of sewer air through the house drain, its use renders the ventilation of sewers more difficult and costly.

This contention raises the whole question of the ventilation of sewers, on which much time has often been spent, and many papers written and discussed. We are all of us acquainted with the difficulties which surround this subject, and the committee have evidently been thoroughly aware of these difficulties, with which they deal at some length, and it is interesting to observe that on page 41, par. 119, they state:

> "Too much importance has been attached to the question of sewer ventilation, for there is a considerable amount of evidence which indicates that the necessity for ventilation of sewers has been exaggerated."

In connection with this, I may perhaps be allowed to point out that at the Sanitary Congress at Dublin, in September, 1884, I read a paper, which I called "Isolation *versus* Ventilation," in which I endeavoured to point out that the practice of openings in the streets for the so-called purpose of ventilation of sewers then in vogue was unsatisfactory and unnecessary, and that it was more important to isolate the house "by means of simple and effective traps" than to make these openings in the sewers, and that all that was needed, if this were done, was to erect a few "relief pressure shafts" at proper positions on the sewer.

I gave a chronological list of different methods suggested, or tried, for the purpose of ventilating sewers, from the year 1840 to 1884, and it is interesting to note that in regard to the year 1882:

> "Mr. Read, the Surveyor of Gloucester, suggested that all house drains should be used as upcast shafts to ventilate the sewers, for he argued that as the sewer was used for the benefit of owners of house property, so should they contribute to the ventilation."

Which shows, I think, that even twenty-eight years ago the question of the advantage of the intercepting trap was doubted.

The Departmental Committee's Report goes very fully into this question of ventilation of sewers, and arrives at the following conclusion:

> "If, therefore, the objection to the intercepting trap rested solely or mainly on its interference with sewer ventilation, we should be inclined to question the importance of such an objection." [Page 42, par. 121.]

I agree with this conclusion, though no doubt the advocates for the abolition of the trap may have many arguments in favour of the free ventilation of sewers through the house drains as being the solution of the problem.

It is contended by many persons, and the report also deals with the question, that the presence of the trap in the house drain containing sewage, often in a state of decomposition, largely contributes to the formation of gases and offensive smells in the sewer, and there is some considerable weight in this contention, if it can be shown that a house drain, without an intercepting trap, would never contain decomposing sewage. I propose to deal later with this contention.

2. The fresh-air inlet necessitated by the provision of an intercepting trap, often acts as an outlet for foul air and creates a nuisance.

This contention is supported by considerable evidence in the report, especially by Dr. Butler of Willesden, who stated, *inter alia*, that over a series of years diphtheria had prevailed in his district more in areas where the intercepting trap is universal than in areas where the trap was absent.

The report says [page 3 par. 10]: "With few exceptions the evidence was unanimous that the inlet is an objectionable feature of the house drainage system," not only as an outlet for smells, but also as being sometimes responsible for blockage of the trap through earth and detritus getting into it.

The committee, moreover, were not sure that a fresh-air inlet is essential for an intercepting trap, and they quote some experiments made by Mr. Steele in support of this contention.

We shall, I think, all agree that if the fresh-air inlet is placed in an inappropriate position, it may at times become a nuisance by acting as an outlet for drain air instead of as an inlet, even if provided with a mica flap; but even if this is so, it may be argued that a smell coming from this inlet indicates that there is something wrong with the drain which requires remedying. In other words, the fresh-air inlet becomes a useful detective. The remedy also, if one is required, would appear to be that of placing the mouth of the inlet in such a position that, even if it did act as an outlet, it would be harmless.

3. The provision of a trap and its companion ventilation of the house drain increases the cost.

This is obvious, and the report does not deal with this question beyond stating it as a fact. It is not of much importance, for if the trap is really required the question of cost need not be considered.

4. The final indictment, and that which is of the greatest importance, is that the intercepting trap "forms a serious impediment to the passage of sewage from the house drain to the sewer, and that this frequently results in more or less complete blockage of the drain."

It was this alleged blockage by the presence of traps in the house

drains at Willesden that first called the attention of the Local Government Board to the question whether the intercepting trap was not more of a danger to the occupiers of a dwelling-house than a safeguard against the intrusion of the air from a sewer. The whole trend of the report is in the direction of proving that this indictment is correct, that such blockage may, and does often occur, by reason of the trap failing to clear itself, and that this objection causes a greater danger to health than the possible admission of sewer air into the house drains.

The contentions by the opponents of the intercepting trap in this respect are:—

(*a*) That it is always a positive obstacle, and is never clean;

(*b*) That it is the main cause of the blockage of house drains, with all the attendant evils;

(*c*) That it contains sewage which, under certain circumstances, is in an advanced state of decomposition, and is the chief cause of bad smells in the sewers;

(*d*) That the primary object of good drainage, to get rid of the fouled water expeditiously, is defeated;

(*e*) That it is, at best, an insufficient safeguard, liable to be forced by air pressure at any moment;

(*f*) That it forms no obstacle to the passage of rats;

(*g*) That the supposed dangers of sewer air have been greatly exaggerated.

With regard to these indictments the report contains some exceedingly interesting evidence, and the results of careful investigations and experiments.

The report gives the results of the systematic examinations by Dr. Butler of intercepting traps in his district, which show a total number of blocks of 3·7 per cent. of the total drain inspections. In addition to this the committee caused examinations to be made of traps in other districts throughout the country, with the result that of the traps examined 6·9 per cent. were found to be blocked at the time of examination, and 16·2 per cent. "gave evidence that at one time and another they had been blocked sufficiently to cause an accumulation of sewage in the inspection chamber." The total number of traps either blocked at the time, or indicating previous blocks, amounted to no less than 23 per cent. of the traps examined for both purposes.

But this is not all. Mr. Patten Barber, the Borough Surveyor of Islington, carried out a series of exhaustive trials in order to ascertain what amount, if any, of the solid matters, usually flowing in a house drain,

would be retained in an intercepting trap, placed in the usual manner upon a house drain. These experiments showed conclusively that with every class of trap he tried [seven in number], more or less solid matter was always retained in the trap. In some cases this amounted to from 42 to 49 per cent. of the solid matters, and in others from 73 to 78 per cent.

If it were not for these experiments, it might be argued that some, if not all, the blockages might have arisen from one or other of the following causes: the improper fixing of the trap; the choice of an improperly designed trap; the insufficient fall of the house drain; or, from its size, the admission of some foreign matter into the house drain; or from some other cause for which the intervention of a trap *per se* was not responsible; but in view of Mr. Barber's experiments, which appear to have been carried out with great skill and care, these arguments appear to be inadmissable.

It may, of course, be argued that the two-gallon or even the three-gallon flush is insufficient to keep the trap or even the house drain clear of obstruction.

About fifteen years ago I carried out some experiments with house drains, laid at similar gradients to those in Mr. Barber's experiments, which conclusively proved that such flushes were insufficient to clear a drain [laid without any trap], except by many successive flushes. It was very interesting to observe how it required flush after flush to induce the fæcal or other solid matter to move a few inches at a time in a drain, and it showed that until there was sufficient obstruction to raise a slight head of water on the obstruction itself, it remained immovable.

If this was so in the drain itself there must arise at times a considerable accumulation in the intercepting trap. I do not know if Mr. Barber found the same difficulty in moving the solid matter in the drain itself when carrying out his experiments. If there is this difficulty in keeping the house drain clear of deposit, the indictment against the trap, that it is one of the principal causes of foul smells in the sewer, must be greatly modified, as the drain itself becomes a greater contributor.

The remedy, if the trap is to be retained, appears to be either that a larger flush of water is necessary, or that the drain must be laid with a steeper gradient, or that the design of the present trap must be altered.

Mr. Barber's experiments go to show this, for whereas a 4-in. trap, No. 4, retained 79 per cent. of solids, an experimental trap only retained 8 per cent., and this after ten experiments, in which on six occasions no solids whatever were left in the trap. Mr. Barber does not give the design of this trap, but no doubt he will pursue his investigations in this direction.

With regard to the possible forcing or unsealing of an intercepting trap by air compression in a sewer, the committee deal with this question at some length, and refer to the Bristol experiments. They come to the very proper conclusions that—

> "when a trap is forced by air pressure the water seal, though reduced in depth, is not liable to be destroyed";

and they further state [page 16, par. 50]—

> "On the whole, therefore, it would appear, according to the evidence presented to us and according to our own experimental observations, that under practical conditions the intercepting trap usually answers its purpose as a barrier to the passage of air from the sewer into the house drain."

With which conclusion I entirely agree; it is well known that air will always take the line of least resistance.

As to the passing of rats through a trap, the report states that in the opinion of the committee it is doubtful whether the trap is a barrier, and they give two instances of chased rats seeking refuge through traps into house drains. In the cases quoted it would appear that the rats were actuated by fear, and that in order to escape they preferred a bath to sudden death! I am of opinion that the trap is a barrier to rats under normal conditions, and that they will not pass through the water in a trap except under some dire pressure. I have known several cases of houses connected to old sewers which were infested with rats, and that these pests disappeared when the house drains were properly trapped and disconnected. It is evident that rats, like sewer air, will take the line of least resistance.

I will now pass on to one of the most important investigations of the committee, that of the chemistry and bacteriology of sewer and drain air, on which considerable time and thought appear to have been devoted.

Evidence on the chemistry of sewer air was laid before the committee by such well-known experts as Dr. J. S. Haldane and Dr. Hurtley, and the report of Professor Delépine on the Manchester sewers is also referred to. The conclusion to which the committee arrived [page 20, par. 62] is as follows:—

> "The results obtained by these observers are practically identical, and they indicate that in sewers, whether old or new, ventilated or unventilated, in which sewage is moving and is not lying stagnant, the air differs but little from that of the atmosphere outside."

Carbon dioxide was only found to the extent of from 17 to 20 parts per 10,000 as compared with 3 or 4 parts per 10,000 outside, the excess of ammonia and organic matter was almost negligible, and the sewer air was

free from any appreciable trace of methane or carbon monoxide, and this, if present, must have been due to the admission of coal gas.

Sulphuretted hydrogen also, they state, is not present in the air of sewers. In some sewers, notably at St. Helens, Lancashire, this gas is found, due to the nature of the trade effluents discharged into the sewers, but this is a rather abnormal case.

Dr. Haldane, however, has found that this gas is given off in considerable quantity "from the traps of house drains in which sewage is apt to be retained, such as large grease traps." This is another serious indictment of the trap, although in this case he refers specially to "large grease traps."

With regard to the smell of sewer air, which is evidently not due to sulphuretted hydrogen, but more probably from "the presence of minute quantities of a variety of volatile substances," the report says, "it is doubtful whether the smell of sewer air is usually more offensive than drain air," and that "untrapped waste pipes of sinks and lavatories discharging into the open air" may cause a "serious nuisance."

The committee are further of opinion that the effect of smell on the human body may not only be repugnant, but that "there seems to be no reason to doubt that it may produce definite ill-health."

With regard to the bacteriology of sewer air, they made many investigations, and, *inter alia*, they say:

> "The bacteriology of sewer air has been the subject of many investigations, and in one respect the results obtained have been practically uniform, namely in showing that notwithstanding the immense number of microbes in sewage, the number to be found in sewer air is extremely small."

Further, they say that:

> "It seems also clearly established that not only the bulk of the bacteria of sewer air are derived from the atmosphere, but also that bacteria of sewage origin (that is, those that may be pathogenic) are very rarely present in sewer air, and that, when their presence can be detected at all, their number is very small."

They then deal with the bacteriology of *drain* air as distinguished from *sewer* air, and quote the experiments made by Colonel Horrocks, Dr. Andrews, Dr. Renney, and Professor Winslow, and they arrive at the conclusion that there are more microbes in drain than in sewer air, and that this is mainly accounted for by splashing, which occurs in the passage of sewage in a house drain, "especially when falling from a height or passing through a trap." This makes a further, and rather unexpected, condemnation of the intercepting trap, and I do not see how splashing could be prevented in a soil pipe unless this were made in the form of a

spiral, and even then I fear there would be some splashing. The question of the possible passage of microbes from sewers into drains is dealt with at very considerable length, and altogether no less than fourteen pages of the report are devoted to these questions of the chemistry and bacteriolgy of sewer and drain air.

The conclusions at which the committee arrive are as follows [page 33, par. 97]:

> "The results of these experiments emphasise the point to which we have already referred, namely, that the bacteriological evidence indicates that if any bacterial danger exists at all in house drainage, it is to be found in the drain air that may escape from the outlets of ventilating shafts of house drains. But even this danger requires to be regarded in its true perspective, as we have pointed out. [Pars. 91 and 92.]"

The paragraphs here referred to are of considerable length, and refer, so far as I understand them, to the important point as to whether disease germs from a neighbouring house can find their way through an untrapped drain into the house in question. This seems to be the crux of the whole question. The object of the intercepting trap, as I have always understood it, is to sever, or isolate, the house from the joint drainage of other houses in order to secure safety from possible infection from other houses.

It would appear from this important report that it is extremely doubtful if this result has been obtained, and that, notwithstanding the numerous legal cases that have been fought and won on the question of sewer air entering houses and causing disease and even death, we are now told that drain air is more dangerous than sewer air, and that the intercepting trap is not only a delusion and a snare, but that it is a positive danger to the health of the inhabitants owing to its liability to choke, to the accumulation of sewage which it holds, to the germs which it emits, to the splashing which it causes, and to its interference with the proper ventilation of the sewers.

To those of us who have been brought up in the belief that great reliance was to be placed on the proper trapping and pneumatic severance of a house drain, this report is bound to shake our faith, for in view of the evidence that was laid before the committee, and the care with which they carried out their investigations, we are bound to accept the conclusions at which the committee have arrived.

In connection with this vital question, it is very interesting to refer to a book published in 1898 by Mr. Alfred Roechling, M.Inst.C.E., a Fellow of our Institute, entitled "Sewer Gas and its Influence upon Health," in which the author deals with the question of sewer air and its dangers, and he gives a number of quoted cases in which sewer air had

been held by the Courts to have produced disease, and even caused deaths. Time only allows me to call attention to this book without discussing it, but in view of the departmental report, on which this paper is written, I feel that attention should be drawn to the book as it is in some respects contrary to the evidence and conclusions of the committee.

Mr. R. Read (Gloucester) in opening the discussion, said he was sorry that Mr. Boulnois did not appear to be convinced as yet as to the wisdom of the abolition of the trap. The intercepting trap was incorporated in the Local Government Board Model By-laws in 1877 after a panic, without investigation, and it thereby became legalised and taken for granted. Defects soon shewed themselves, and between 1879 and 1882 while he was experimenting with sewer ventilation, he first formed the opinion that the trap was a useless and dangerous obstruction, paralysing the action of the drain, and rendering it filthy throughout. Thirty-five years of tinkering had failed to remedy these defects, because the trap was wrong in principle. Mr. Boulnois' "detective" shewed that "the something wrong" was the trap itself. Any inspector testing a drain, and finding a single pipe with $\frac{1}{2}$ inch. back fall, would order it to be relaid, and rightly so, but the same inspector legally and cheerfully inserted the trap forming an obstruction 6 ins. to 8 ins. deep below the invert of the flattest length of the drain. Inspectors generally had a childish faith in this trap, but an utter unbelief in the similar trap, placed in the absolutely impregnable position, between the water-closet and the ventilated soil pipe. For nearly thirty years he had few supporters, until Dr. Butler joined him in February, 1906, when they both read papers before this Institute, entitled "Is the Intercepting Trap a Failure?" In 1908 the Local Goverment Board appointed a Departmental Committee to consider the question. The committee made an investigation lasting four years, examined fifty-two witnesses, including two chief sanitary inspectors, obtained voluminous statistics from various towns in the United Kingdom, America, and Germany, and also conducted numerous special experiments both themselves and by a score of experts. The result had been their Report, now under discussion, which condemned the intercepting trap on every count of the indictment.

The Committee, however, gave the trap the benefit of the doubt on one of its claims only. They could not discover any pressure on the sewer side of the trap, until the mouth of the sewer connection was covered by sewage, but when this happened the stagnant sewer air, imprisoned in the length of drain between the sewer connection and the intercepting trap, containing about five cubic feet, was forced through the water seal of the trap, and in many cases the stopper was blown out of the raking arm. The stoppers fell into the mouth of the trap, and were not replaced, the obstruction was then complete, and the chamber flooded up to the level of the raking arm, through which the drain discharged,

and the sewer air had free communication from the sewer to the house drain. That state of things might go on for months. The advocates of the trap were so hard pressed they had to fall back on rats. Rats could dive easily through an intercepting trap, because there was a good take off and a good landing at either end, but it was impossible for them to get through a yard gully with a grid on, because the gully was 10½ ins. deep and the grid weighed 3 lb., and the rat would have to stand on the tip of his tail, tread water with his feet, and raise the grid with his nose.

The primary object of drains and sewers was quick delivery to the outfall before decomposition set in. The intercepting trap retained the whole of its contents for at least eight or ten hours during the night, and for shorter intervals during the day. The total length of drains in proportion to sewers was as five to one. The flow from the drains was intermittent, while that from the sewers was continuous; sewers were what the drains made them. Mr. Boulnois mentioned some experiments of his twenty years ago, when he had difficulty in flushing a drain where there was no trap, but at that day it was most likely that he had to use a valve flushing box, which only discharged as long as the chain was held down, but a modern two gallon automatic flushing box would clear a 4 in. drain very easily, and a 6 in. drain not quite so easily. Two gallons would fill 4 ft. of 4-in. drain, or 2 ft. of 6-in. drain. The removal of the trap made both drains and sewers cleaner, therefore there must be less risk in its absence, and not more. The experiments at East Grinstead and by Dr. Andrews proved this.

DR. PHILIP BOOBBYER (Nottingham) said that he unhesitatingly accepted the scientific results and conclusions of the Departmental Committee. With some of the facts given in the report they were, of course, acquainted, through the work of Major Horrocks and others, several years ago. The report confirmed all that they were told as to the danger of splashing, and it amplified the information they already possessed to a very considerable extent. He only demurred to the general application of the results arrived at by the Committee to cases essentially different from those which furnished them. The behaviour of sewers in different localities was as diverse as their method of construction, their situation, and their contents. Sewers of low and high gradient did not require the same treatment. In low-gradient sewers and drains there was often much deposit, and in high-gradient sewers almost violent movement of sewer air. In the sewers of London and Paris one could walk about and feel no discomfort whatsoever from the fact that one was breathing sewer air; but there were sewers of many provincial towns, which received the drainage of slaughter-houses and the sewage of offensive trades, the air of which was intollerably offensive. In London they had no such conditions, as the offensive trades were all relegated to the outskirts; but in many provincial towns most offensive material was discharged into the sewers, and often at a fairly high temperature.

One argument used in the report they ought to demur to, and he was

sorry it had been introduced. They did know definitely, and were continually preaching it to their clientèle in the big provincial towns, that there was no causal relation between ordinary sewer air and diphtheria. In the report the inference appeared to be in the contrary direction, and it had been quoted to him by a member of his council. He believed that many of the experiments had been made with badly-constructed apparatus, and probably in too large drains. He was in favour generally of retaining the intercepting trap, and would give the principal considerations which influenced him in arriving at that opinion. The intercepting trap, when acting efficiently, as in his experience it usually did, prevented the access of undiluted sewer air to the atmosphere in or around the dwelling. The sewer air in most of the places with which he was acquainted, both on account of its quality and quantity, was much more liable to cause a serious nuisance to the occupants of the dwelling than the drain air of the dwelling, when allowed to escape in the immediate vicinity of the latter. He was not speaking of injury to health, but of what the public defined as a nuisance. Those of them who had to do with health work in provincial towns knew how impossible it was to convince the ordinary layman that a bad smell was not necessarily associated with a corresponding injury to health. He had often gone into gut-cleaning establishments and seen people unaccustomed to the characteristic odour rendered almost sick by it, and such people were usually quite incapable of dissociating the question of offensiveness from that of injury to health. They thought the measure of its offensiveness to their nostrils must be the measure of its injurious effect on their health.

He had known several instances in which an intolerable nuisance had been occasioned through the ventilation of a public sewer by means of a high tubular ventilator carried up to the outer wall of a dwelling house, the sewer air being directed by air currents and eddies into the interior of houses in the vicinity by the windows and chimneys. He had in mind the case of an 6-inch sewer ventilator which the City Surveyor put at the top of a street where the gradient averaged only about one in six for some hundreds of yards. It was put up on a vicarage wall, at the request of the vicar. This vicar died soon afterwards (of old age), and his successor was a young and well educated man, but he believed in the injuriousness of the sewer air, he said his house was continually filled with a horrible odour, and he made them pull the ventilator down. Under such conditions, of course, sewer air was specially liable to reach the interior of houses in hilly districts. In the absence of the intercepting trap, any sudden movements of the sewer atmosphere, which under ordinary circumstances were exceedingly prone to occur, frequently forced water-closet and other traps, especially when these were connected with long or obstructed soil pipes. In the absence of the intercepting trap, any unoccupied dwelling house or residential flat would become flooded with sewer air, as soon as the water-closet and other traps had become unsealed by evaporation. In Nottingham Park, where there were big houses, which became empty from time to time, it was not

at all an uncommon thing for the houses to be almost unapproachable on account of the fact that they were flooded with sewer air, owing to the evaporation of the water in the water-closet pans. As to the question of liability to obstruction, his experience was this was relatively slight, and such experience lent colour to his suggestion (made above) that the committee's experiments might have been made with defective apparatus. Only that evening he had been drawing attention to the radical alterations which had taken place in the views held by experts as to what should be the form of the trap, and to the changes in the trap during the last thirty years.

There were three large hospitals in his district, each having more than six of these intercepting traps, and one having sixteen. He had had occasion to repeatedly examine the drainage systems in the last twelve years, and only twice in this period had he found an intercepting trap on these systems to be completely obstructed. Of course, they frequently found cases of gross misuse, but that would occur with any apparatus. If an occasional breakdown was to be considered sufficient ground for condemning the apparatus, then many things must go by the board, including water closets.

Mr. T. de Courcy Meade (Manchester) said that the report of the Departmental Committee had taken three-and-a-half years to mature. It, no doubt, required some ingenuity to frame a report reversing the settled policy of the Local Government Board, but the authors appeared to have carefully performed their task. He was invited by the Secretary to give evidence, and in pursuance of a resolution of the Manchester City Council, he prepared for the Departmental Committee facts and figures which were supplied to the Secretary, Mr. Perry, on 27th April, 1909, together with a précis of the evidence he was prepared to give; and the documents were duly acknowledged by the Secretary. The statistics showed that at that time there were 23,248 intercepting traps in use in Manchester. The ascertained average number of stoppages per year amounted to 150, or ·64 per cent. per annum. He did not know whether facts showing a like result were received from other large towns; if they were, it would be interesting to know how they were dealt with by the Committee. He held an open mind on the question of intercepting traps, but the facts relating to Manchester showed pretty conclusively that intercepting traps of proper construction in conjunction with properly laid drains did not give the trouble found in other places. The Committee's report contained particulars of some interesting experiments, conducted for them by Mr. Patten Barber, at Islington. He would like to compare these experiments with those carried out by the Council of the Institute under the immediate direction of Mr. Rogers Field in 1892, and with the results of investigations of a similar nature made by himself many years ago. The table showed the results of the three sets of experiments.

The weak point in all the investigations was the use of artificial material, or

Table Showing Comparative Results Obtained by Three Independent Investigations.

Name of observers.	Average percentage of total materials retained.			Average percentage cleared.	Length of drain.	Inclination of drain.	Diameter of drain.	Quantity of flushing water.	Number of experiments.	Remarks.
	In w.c. trap.	In drain.	In intercepting trap.							
San. Inst.....	5	14	35	46	50 ft.	1 in 40	6 inches	2 galls.	120	Table B, p. 242, Trans. San. Inst. Vol. 24.
Barber	...	...	78	22	80 ft.	1 in 60	6 inches	2 galls.	10	Table 16, p. 71, Rept. Dept. Com. 1912.
... *(a)*	10	35	30	25	58 ft.	1 in 36	6 inches	2 galls.	24	Stable manure, paper, cut oranges, etc.
... *(b)*	7	31	37	25	58 ft.	1 in 36	6 inches	2 galls.	60	
Meade ... *(c)*	6	22	39	33	58 ft.	1 in 36	6 inches	2 galls.	18 daily observations	In use by workmen.
... *(d)*	* $\frac{3}{4}$ oz.	† $14\frac{1}{2}$ oz.	‡ $4\frac{3}{4}$ oz.	§	‖ 64 ft.	1 in 52	6 inches	2 galls.	3 months' observations	House drain in use under normal conditions, 2 w.c.'s, 1 bath and 1 sink were in use.

* Caught on gauze scoop in sewer side of trap.
† Fæcal matter, paper, grease, etc., retained on scoop during bath flush.
‡ Ditto, ditto, removed from both sides of trap fixed in centre of chamber.
§ Could not be ascertained.
‖ Average length measured to midway between w.c. and scullery sink.

"artificial excreta" as it was termed in the report of the Council of the Institute. The material used by Mr. Rogers Field was composed of a mixture of soft soap, cocoa fibre, clay, and pieces of newspaper. That at Islington consisted of clay, tow, Russian tallow, and pieces of toilet paper. That used by himself was composed of stable manure with a small percentage of cow-dung, granulated cork, sliced oranges, and pieces of newspaper. His first series of experiments were made with a 6-inch stoneware drain 58 feet in length, with a fall of one inch to the yard. The experiments were particularly directed to different kinds of closets and waste-preventing cisterns, as well as to the condition of the drain and trap. In the third series of tests two closets used by workmen were employed, and the observations were made without the knowledge of the men using the closets. The materials found in the traps and drain were at times instructive. The closet traps usually retained a small quantity of excreta and paper, but occasionally large wads composed of sheets of newspaper rolled up, pieces of clay pipe, matches, empty match-boxes, and other articles were found in the traps or in the drain. The latter always contained a considerable amount of deposit, which was gradually moved forward each time a closet was used. The intercepting trap was never free from deposit. In those experiments with appliances in actual use, it was of course impossible to determine with strict accuracy the proportional quantities of material left in the drain and traps, as the total amount had to be ascertained after, instead of before, admission to the drain. The results were, however, carefully checked, and were believed to be accurate. Those experiments were followed by observations on closets and traps in use in a dwelling-house, the fittings and drain being specially prepared for the purpose, and generally they confirmed the accuracy of the tests last referred to. A glance at the table would show how largely the results obtained by each observer varied. That might be accounted for by the difference in the character of the material; the methods of applying the tests; and in the artificial and actual use of the closets. It was in consequence of the variations in this last respect that he did not publish the results obtained, and for the same reasons the results obtained at Islington could not be accepted as conclusive, although their thanks were due to Mr. Patten Barber for the time he had expended, and the trouble he had taken over them.

Mr. F. Summer (City of London) thought every municipal officer was indebted to the Willesden District Council and to Dr. Butler, and to his late chief, Mr. Robson, for being instrumental in getting the enquiry. Personally, he was strongly against intercepting traps where the distance from the trap to the lavatory accommodation was great. In Willesden many of the houses were small, and probably the water-closet was 100 feet from the interceptor. Having been in that district for two years, he found that many of these interceptors were continually being choked, due to the fact that the force of water was ruined by the time it got to the interceptor,

and there was conseqnently no chance of getting the fæcal matter away from the trap. The report sounded the death knell of these traps. It was a good thing that the question of the danger from sewer air had come up; almost every municipal engineer would admit that the men employed in the sewers were the healthiest men that could be found. Fourteen or fifteen years ago the medical officer for Camberwell inspected the whole of the sewer men throughout the Metropolis, and came to the conclusion that they were about the healthiest men in London. Some eight years ago Mr. Van Putten raised through his Council with the local authorities the advisability of removing these traps, and he (the speaker) reported to his authority that he was entirely at one with the suggestion to remove the traps from small houses, but as regarded larger houses where baths were used, and also where a large number of people were employed, he thought it should be optional on the occupier as to whether the trap should be continued. He still held that view. They would have to overcome the prejudice of the medical officer, the architect who designed the house, and the person who used it, but he had no doubt that in a few years' time the whole of the houses would be disconnected when the fallacy of the value of the trap had been properly explained. In the City of London each of the premises was drained by a single drain, but every one of the premises had its interceptor, and during last year they had only about three complaints as to the interceptors being choked. It might be said that was a point in favour of continuing intercepting traps, but in his view it had no value. Circumstances were quite different in suburban districts. In the City they would have thirty or forty closets connected with one drain, and the force and quantity of water going down the drain was sufficient to prevent choking. On the other hand he believed every engineer would welcome the removal of the traps, because when one did become choked the inconvenience was very considerable. He strongly advocated that house drains should be made of iron, and the additional expense in a reasonably-sized house would not be more than 20 per cent. That was one of the cures for the whole thing, and in such a case the intercepting trap might well be dispensed with.

Dr. W. Butler (Deputy Medical Officer of Health, L.C.C.) complimented Mr. Boulnois on the scientific attitude he had adopted in his paper, for the committee obviously had reported in a manner contrary to the views he had previously held. It was an attitude of mind which might well be generally adopted. To approach the question in a partisan spirit was not to arrive at the truth, and it was astonishing how much feeling was introduced as soon as the usefulness of the trap was questioned. He was brought up in the orthodox faith that the intercepting trap was a revered institution not to be questioned, and it was only because of the facts which were borne in upon him as an administrator that he had been forced to question the dogma. It was not the number of complaints as to the choking of interceptors which raised the question,

and that was a point which must be dealt with from the beginning. They were told that in Manchester only 0·6 per cent. of the drains had been the subject of complaints during twelve months, but he considered that a high percentage so far as complaints were concerned. In Willesden the complaints of choked drains were comparatively few, but what he discovered was that if for any purpose they had to examine manholes they found in a large proportion of cases they were choked and the cap of the raking arm was missing. It was that which caused him first to make a systematic inspection of the manholes, and then they discovered that although the complaints were few, yet something like ten per cent. of the raking arm-caps were missing, and three to four per cent. of interceptors were choked, which in about 40,000 inspections was really a very serious matter. He found now it was the fashion to say "That was Willesden," and "The Willesden drains have not been laid as the Metropolitan drains are laid." That, however, was not the case; and, moreover, Willesden compared extremely favourably with the other districts examined by the Departmental Committee. The percentage of choked drains was higher outside Willesden than within. He remembered that when the chairman of the committee visited Willesden how struck he was by one fact. An inspector was sent round to examine the manholes to see if he could find any choking, and he might say they could always rely on finding instances of choking or of patent raking arms whenever they so desired. They went to a house and discovered a choked drain. The manhole was full to a depth of seven or eight feet of stinking sewage, with the thick scum and other features usually associated with sewage in a septic tank; the people in the house were asked if they were aware that there was anything the matter with the drain, and they were quite unaware of it. That drain had been choked probably for months, and they knew nothing about it. People did not know when drains were choked, and the Departmental Committee recommended that in future, whether they had interceptors or not, drains should be made in such a manner that there should be an early indication of any choking. At present people did not become aware of it because, even if the drain were tight, the brickwork of the manhole permitted percolation, and they might have a grossly insanitary condition of things without people knowing anything about it. Dr. Boobbyer had told them that without the interceptor there was great nuisance, but if every house drain ventilated the sewer they would not have to face the sewer air which at present existed because of the inadequate ventilation of sewers. They would do away with it as soon as they did away with the intercepting trap.

Above all things what they wanted to recognise was that the reason for doing away with the intercepting trap was not because they despised sewer air, or were indifferent as to its admission to their houses, but because it was the only effective way in which they could safeguard themselves from that undesirable thing. It was because the presence of the intercepting trap with its necessary appurtenances really led more to the pollution of the house by sewer and drain

air than in its absence that one desired to see it removed. The trap necessitated a fresh air inlet, and this in nine cases out of ten was placed close to the house. If by any mechanical device they could find that a drain deep in the clay would permit of the escape of a film of smoke the drain had to be reconstructed, and yet they would allow a 4-inch opening immediately below the sill of the window direct into the drain, and no one thought anything about it. So indoctrinated had they become as to close their eyes to incompatible facts of that kind. The point which had been most constantly urged against the abolition of the intercepting trap was that of rats. He was not really concerned as to whether the intercepting trap stopped the rats entering the drain or not, but he believed it did not. The rat in itself was a harmless creature, and it did not matter. What did matter was the rat getting out of the drain into the house, and thus opening direct communication between the drain and the house, and that only happened when the drain was defective. Nobody suggested that a defective drain should be permitted. If they did away with the interceptor, the corollary was that the drains should be made gas tight and rat tight, and that could be done by having an iron drain. It might well be made a condition of the abolition of the trap that the drain should be of iron, and further that it should be hermetically cut off from the manhole, so that the moment there was a blockage it would show at once at the nearest gully.

Dr. Louis Parkes (Chelsea) said the choking of house drains, which had intercepting traps, was not always the fault of the system. As contributory causes to the stoppage of the trap, they must recognise that the faulty laying of drains above the traps, and defective sewer connections, played a considerable part, besides bad forms of trap, and traps too large for the house drain. In his experience house drains were not at all frequently blocked by stoppage of the traps, and blockages that did occur were often due to accumulations at the flap of the sewer, which could only be cleared from the sewer. The artificial fæces used in the experiments described in the Committee's Report consisted partly of clay, and would, therefore, be much heavier than water, whilst ordinary healthy human fæces had a specific gravity but little greater than water, and very often floated on water. These facts detracted very considerably from the deductions made in the report as to the liability of intercepting traps to become choked from retention of solids derived from matters flowing into them, which resembled ordinary fæces in a remote manner.

Colonel Horrocks had shown, and it was now generally recognised, that drain air might become heavily infected with the microbes contained in sewage owing to the splashing which occurs in drains and inspection chambers receiving the discharges from upstairs w.c.'s. But Colonel Horrocks had also shown (and this had not been sufficiently realised by the Departmental Committee) that where there were not any intercepting traps such infected drain air might pass into the sewer, and thence ascend the drains of neighbouring houses. This would be

most likely to occur where the sewer was a pipe of comparatively small calibre. It was important that the infected drain air of one house should be prevented from entering the drains of another house; but if intercepting traps were abolished it was extremely likely that this would happen, as the house ventilating pipes on one side of a street might be acting as exhausts to the sewer, whilst the houses on the other side might be playing the part of fresh air intakes. No one could possibly say what would happen, under varying atmospheric conditions, to the movements of air in the house drains and ventilating shafts of a neighbourhood if all drains were directly connected to the street sewer, and the possibilities of transference of specifically infected drain air from one house to another could never be guarded against.

If intercepting traps were abolished there would be the possibility, especially in warm weather, of nuisance to houses where the drains were connected with old-fashioned brick sewers of flat gradient. Owing to want of rain and flushing such sewers often accumulated offensive deposits, and the emanations arising from such deposits might escape near dormer windows and chimneys. The inhabitants of such affected houses would be more than human if they did not block up the offensive sewer ventilators on their houses, and then there would be the risk of unsiphoned w.c. traps inside houses, and worse evils to follow. All medical experience showed that the pollution of the air of houses by drain or sewer effluvia was often a cause of ill health and disease, and it was altogether irrelevant to talk of the good health of sewer men, who were continually at work in sewers and acclimatised to their environment, or to point to experiments on cats, rabbits, or guinea-pigs, animals very differently constituted from man in their nervous organisations and neuropathic tendencies.

The recommendation of the committee, that fresh-air inlets to house drains with intercepting traps were not required and should be discontinued, was an unfortunate instance of not recognising what was the less of two possible evils. The occasional efflux of drain air from fresh-air inlets was undoubtedly enormously counterbalanced by the useful effect they had in sweetening the air of the drains by the continual inward passage of fresh air.

As regards rats, Dr. Parkes had never in his long experience known of rats being found in house drains where there was an intercepting trap, and the cap to the raking arm was in position. It was important that rats should be kept out of all stoneware drains, as, however good such drains might be, a cracked or defective pipe or joint might occur at any time, and a rat would soon, with his powerful teeth, take advantage of any opportunity to gnaw his way through and form burrows in the ground surrounding the drain. In seaport towns it was especially important to prevent rats getting access to the drains, as infected rats from foreign shipping might easily pass from ships to docks and warehouses and thence to the sewers, conveying with them the infection of oriental plague. It might be surmised that some of the immunity from plague attaching to the seaports in this country, where infected rats had actually been found in the

docks and neighbouring sewers, was due to the fact that rats were unable to invade the houses of the neighbourhood.

In conclusion, Dr. Parkes considered that, whilst the Report of the Departmental Committee was one of great ability, and had very carefully reviewed all the main points of public health interest attaching to the subject, yet the main conclusion, that the intercepting trap was unnecessary, was not justified by the practical experience of sanitarians in the past. The evidence adduced in the Report was of great interest, and was presented with much skill and care, but it could hardly be taken to outweigh the considered opinions of those who were engaged all over the country in practical sanitary work; and until the general consensus of opinion could be shown to be in favour of its abolition, the intercepting trap should remain in sanitary practice as a defence against the possible transmission of disease by aerial currents and rats.

Mr. Ernest van Putten (Lewisham), as one who had opposed the use of the interceptor for over twenty years, welcomed the report of the Departmental Committee, as it had confirmed the opinions which he had often expressed.

He expressed the opinion that there was not likely to be any more danger of sewer air entering dwellings than of drain air; in fact, if drain air entered a building it would be beneficial to have it diluted by sewer air, as the report conclusively proved that drain air was more dangerous than sewer air.

The danger of pollution of the air in houses from the ventilating shafts depended entirely on the foresight used in fixing them. In the Borough of Lewisham there were eighty-nine columns attached to private dwellings for the purpose of ventilating public sewers, and in all cases undertakings had been given to remove the same should the Council be called upon to do so, and yet in not one case had the Council been asked to, the ends of the ventilators being kept well clear of chimneys and windows.

Although upon examination a comparatively small number of interceptors might be found to be choked at the time of inspection, they were often choked without it being noticed, and freed themselves by the pressure of water when it rose to a sufficient height, and this might be detected by the water line visible in the manholes.

He hoped that not only would the Local Government Board no longer make the interceptor compulsory, but that the London County Council would also abolish their by-law on this subject.

Mr. A. J. Dickinson (Redditch) said he had had a long experience of intercepting traps at Sheffield, Birmingham, and now at Redditch. He had seen interceptors put in under the supervision and control of the local authorities, which became choked. Their thanks were due to the Departmental Committee for the impartial and thorough way they had set about a very difficult task, and he hoped they would all be as much open to conviction as the author of the paper

who in 1903 said, "I shall take care that I will never live in a house which has not got an interceptor." From what he had said, he thought Mr. Boulnois very likely would live in such a house now.

MR. BOULNOIS: No, I will not, but I will see it put in myself.

MR. DICKINSON said the chief question they had to consider was as to the effect the report would have on their future policy with regard to interceptors. His own Council on his advice had issued the following circular to architects and builders: "In view of the report of the Departmental Committee of the Local Government Board, the Council feel that they cannot enforce their bye-laws requiring interceptor traps and fresh-air inlets to be provided on the drains of new buildings. In future, plans will be approved if they show all drain openings to be properly trapped, and if a 4-inch vent shaft be provided at the highest point of the drains." He would like to see all existing interceptors abolished, but perhaps the wiser course would be to block up the air inlets that caused a nuisance, and remove the interceptors when they became choked. He did not wish it to be thought that he did not value the usefulness of traps in general, but he regarded it as an axiom that they must be placed where they received the flush of a volume of sewage before it was dispersed in the drain, so that the solids were carried away. He was glad the Committee drew attention to the necessity of trapping the waste pipes of sinks and lavatories discharging into the open air, as they were a serious nuisance when they acted as ventilator inlets to the house.

MR. G. BERTRAM HARTFREE (Alton) said he had come to champion the intercepting trap, and so far he had heard nothing to make him change his views. Eight years ago he was instrumental in enforcing the use of the sweeping-eye pattern in a town that had rarely used them previously, and as subsequently there were several cases of choking he was for the moment in a difficult position, and consequently he determined to go very carefully into the causes of the stopping. He found amongst the causes a bath towel, a scrubbing brush, a child's doll, house flannel, chamois leather, rags, and stiff brown paper, and of course if these were legitimate articles to pass down drains the intercepting trap must be condemned. Other causes of stoppages he found to be the trap fixed with the outlet higher than the inlet; defective drains which allowed the liquid to escape and only the solids to reach the trap; whilst the most common defect was a projecting ridge of cement inside the joint of the trap and the pipe below. The man who laid the pipe used a "badger" or swab which he drew horizontally through the pipe, and this was satisfactory until he came to the interceptor, where the British workman did his best, but instead of drawing the "badger" horizontally he drew it obliquely, with the consequence that there was a ridge of cement left sticking up which caught the first possible obstruction. With regard to the indictments raised against the intercepting trap, the first was that its use rendered the ventilation of sewers more difficult and costly.

Natural methods of sewer ventilation left much to be desired. He suggested a system of extraction with cremation of gases. Much had been said about the effect of sewer gas, and of course it was a question for medical men. In his own case he had had two bad attacks of poisonous boils, and he had been informed by doctors the cause was a sewer germ, stapticocci. As to the eye of the raking arm being blown out by sewer gas he would not blame the interceptor, but would say it was a question of the sewer wanting better ventilation. The second indictment was that the fresh-air inlet necessitated by the provision of an intercepting trap often acted as an outlet for foul air and created a nuisance. In his district fresh-air inlets were not enforced, and no evil results had been found in consequence. Sometimes he advised that there should be two shafts, one a little higher than the other. If a mica flap were used, he advised it to be fixed tipping forward. The open grate type of flap he, of course, looked on as a nuisance. The third indictment was that the trap increased the cost, but all sanitary improvements meant increased cost. The final indictment was that the intercepting trap formed a serious impediment to the passage of sewage from the house drain to the sewer.

They would find the cause to be that leaky drains allowed liquids to escape into the surrounding soil and the solids only reached the trap. Then they got partially choked drains, and the soil was converted to sludge by septic action, and slowly slipped as a glacier to the sewer and stopped at the trap. Whether they had a trap or not, the trouble was caused before it got to the trap; traps were improperly fixed, and owing to shape there were difficulties in fixing them; inspectors should see water flowing through when inspecting new work. A great objection was that there was no provision for a clean invert to joint between the trap and the pipe below; it could not be cleaned properly. Intercepting traps should be made with long spigots provided with access eye to ensure a clean inside joint; a suitable levelling cradle was required when fixing. Instead of being so struck with the question of abolishing intercepting traps, local sanitary authorities should be stronger on ventilating sewers and sterilising the gas rising from them. If traps were abolished would every house drain take a share in the ventilation of sewers? He thought not. Prima facie, the shafts at the low levels would be inlets, and those at the top level would be outlets; but they would have cross currents, and leaky drains would take a larger share of foul gases to dwellings.

Mr. H. C. H. Shenton (Westminster) said that the evidence was almost overwhelming in proving that the intercepting trap was open to objection, and it almost seemed a waste of time to go on discussing the merits or defects of the trap further. He urged at another meeting that they should discuss the question of applying the teachings of the report; because it certainly seemed that they would have to be applied, and in his opinion it would be more profitable to discuss the matter from that point of view. The intercepting trap

was stated in the report to be objectionable and unnecessary. So long as the fittings and the gullies were properly trapped it appeared that there was very little risk of the drain air or sewer gas getting into the house. They would note, however, that while every sink or bath waste-pipe, and everything excepting the water-closet, was trapped twice, at the gully and also inside the house, the water-closet had only one trap, and if the interceptor on the main drain was taken away the closet certainly ought to have more than one trap. There were plenty of instances of traps becoming unsealed, and that was particularly the case in houses that had been left empty for some time, or in the case of a closet in a house which was not used. It would be a serious thing to have sewers ventilated in that manner into the house, and that should be considered.

Mr. C. H. Cooper (Wimbledon) said that the whole crux of the question was "sewer air." The arguments in the report were based on the investigations of the bacteriologist, and whether they could rely upon the bacteriologist or not was a question. In the case of chemistry, which was a science that they had had with them much longer than bacteriology, they certainly could not. He remembered very well a sewage case that was fought nearly thirty years ago, in which the discharge from a bone-boiling works formed a very important point; this discharge smelt most abominably, it was analysed by the late Dr. Tidy, who, in the course of cross-examination, stated that by chemical analysis, he could show no difference between that stinking liquor and beef-tea. In paragraph 76 of the report they had the result of the bacteriological analysis of sewer air. It said: "This is established, not only in the case of good sewers and those which are well ventilated, but also in the case of bad sewers, even those containing more or less stagnant sewage with much deposit, and those in which ventilation was small or absent. Indeed, it is in this latter kind of sewer that the number of sewer-air microbes would appear to be at a minimum"; and then it went on to say: "that those that may be pathogenic are very rarely present in sewer air." That was to say, that in a sewer that contained stagnant sewage and a lot of sewage settlement they found a minimum number of bacteria. Was that evidence of any use whatever on which to base an important Government report? When they had to go down badly ventilated sewers containing stagnant sewage, they felt the effects on their persons. He had rather a sad case among his own staff some eleven years ago. It was the case of a young fellow in the drawing-office, who happened to have sprained his wrist, and as he could do no work in the office he went out with two assistants to examine a sewer, in which there was a good deal of stagnant sewage at the time. The result was that all three were affected; the young fellow ceased work on the third day after, and three weeks later he died of septicæmia. They could get any number of those cases, although the compilers of this report had been unable to do so. Take his own sludge works: time after time they had had men in the pressing-house who had to give up, and he could assure them they would not give up until the very last.

The report referred very largely to the death-rates in Germany, and showed a larger decrease in the death-rate than in this country. He had not been able to work out properly the death-rates here, but in this country, taking the period when intercepting traps came in as 1871, they got a decrease of 23 per cent. in the subsequent rates. When they talked of Germany, they must remember that in years gone by the German people were not living under such favourable sanitary circumstances as the people in England. He remembered quite well in the seventies, when he was serving his time, that it was impossible to get German clerks in the City to pull the plug of the water-closet; whereas the English people who were more accustomed to sanitation always did so. There was no doubt that, prior to 1870 or 1880, our sanitation in England was much better than in other countries, and therefore the reduction in the German death-rate subsequent to 1880 would be much greater than in England. It seemed to him that the great fault in the report was that of making light of the danger of sewer air. It was altogether wrong to condemn the intercepting trap on chemical and bacterioloical analysis, which merely gave certain matters found in sewer air, but failed to furnish any evidence whatever that such sewer air was innocuous. The only statistics available were the death-rates prior and subsequent to the introduction of the trap, and these should be taken from the larger population rather than from isolated towns. As regarded the danger of the intercepting trap getting stopped up, it was like all other devices connected with civilization, it must be attended to, and if not it went wrong.

Mr. H. Johnson (Wimbledon) said the part of the report he wanted to deal with particularly was that referring to the stoppages which had been found in the intercepting traps. There was a reference in Appendix No. 2 of the report to Wimbledon, and the credit of designing the system of sewerage there belonged entirely to Mr. Cooper. As inspector for sixteen years, however, he could give correct figures as to what had been found. If in Wimbledon the percentage of stopped traps was only 1·5, why, therefore, should it be 15·8, 25·3, and 24·1 in similar places? Where such a state of affairs had been discovered it was the duty of the authorities to institute an inquiry as to why it should exist. The questions of the ventilation of sewers and the interception of house drains were closely connected, and one could not very well speak of one without the other; but it was not necessary that the ventilation of public sewers should be done through the soil pipes of the house drains. The system at Wimbledon showed that it was quite possible to devise an effective scheme and ventilate the sewers by means of ventilating pipes put up and maintained by the public authority. Some speakers had said that the drains and sewerage system were all one, and that it was no hardship to the owner of private property if he ventilated the public sewer; but there was this point to be considered: The owner of private property had the means of ascertaining whether his drain was perfect. If it was not he could remedy it; but if the public sewer was

not acting rightly, he had no means of remedying it, and there were sewers *and* sewers. Then it was said that the fresh-air inlet, necessitated by the intercepting trap, was a cause of nuisance. That might be so if the intercepting trap was of bad design or was badly placed, if there was any misuse, or bad workmanship. In Wimbledon it was recognised that the mica flap valve more often than not would be out of order, and consequently they never fixed it. A 4-in. pipe was brought up above and as near to the ground surface as possible, protected by an iron grating, and the outlet shaft was as high as possible, and their experience was that so long as there was a movement of air they got little foul air in the drain. In his sixteen years' experience he was correct in saying that in the portion of his district with 30,000 population, not ten per cent. of the houses had baths. They had simply a water-closet and a sink, but the number of complaints was extremely few: and they found the cases remarkably few in which foul air had come from the fresh-air inlet.

As to stoppages, he had had occasion to examine the drains of 1,303 houses in the same neighbourhood. He not only examined the manhole, but also examined the houses where there were free access caps and a manhole at the back, and in most instances found the stoppages were between the back manhole and the front. If they had examined the front manhole a little later, in all probability they would have found the obstruction there, and the intercepting trap would have been blamed for what was not its fault. It had been borne out by other inspectors, who had since examined the back manholes, that they found as many stoppages in the back manhole where there was no intercepting trap, as in the front where the intercepting trap was, and the great majority of the stoppages were undoubtedly caused by misuse. If for the misuse of a sanitary appliance they were going to scrap it, then all drains would have to be scrapped. On their surface water sewers they had no intercepting trap, and those were the only sewers of which they received any complaint of smells. Paragraph 76 of the report, if taken to its logical conclusion, meant that the more they ventilated the sewers the worse they were from the bacteriological point of view. Sewer gas had a harmful effect on many human beings, and he would like to give one case:

For some thirty years his father suffered from tonsillitis and septic quinsy at intervals of two or three months. He knew there was a sewer under his house, because he had been unwise enough to permit one to be constructed there. The specialist he consulted told him the origin of his illness was drain or sewer air, but believing that the sewer was perfectly air-tight he disregarded the statement. At last he was induced to have the sewer tested by smoke, and it was discovered that almost under his desk one joint had not been made. This was remedied and he had never suffered since. It might be a coincidence, but it was no use his telling his father that the report said sewer gas was not harmful. He did not think the committee were justified in coming to the conclusions they had regard-

ing the number of stoppages, and if they had taken a far larger number of towns they would have found a different state of affairs. One thing he agreed with in the reports was that the by-law requiring the provision of an intercepting trap should not be compulsory, and that the local authorities should be given the power to exercise discretion. The building and sanitary by-laws had, no doubt, caused hardship by their compulsory nature, because they had to apply the same rule to all cases whatever the circumstances might be.

Mr. Walter Jennings (Lambeth) said competent authorities were practically agreed that the danger lurked in the smaller private drains rather than in the larger public sewers; yet, while great importance and attention had hitherto been paid to the disconnection of the private from the public drain, little or none had been given to the disconnection of water-closets from soil pipes or house drains, and, most illogically, whilst it was deemed imperative to doubly trap, disconnect, and ventilate the waste pipes of baths, lavatories, and sinks, the most important sanitary appliance, and the most frequent source of danger, the water-closet, was not disconnected at all. In hotels and mansions it was the custom to find installed side by side lavatories, baths, and closets fixed under the conditions named, and it was the duty of sanitarians to make secure the first line of defence, and render the house impregnable to any incursion from the house drains, before considering the outworks, as they might term the public sewer, which, although of great, was admittedly of secondary, importance.

Mr. Edward Willis (Chiswick) remarked that a good deal had been said during the discussion as to Willesden being the cause of this inquiry, and it had beeen much maligned in consequence, but he believed they had done very great service in bringing together so much evidence, which was undoubtedly useful, although many present might differ from it. What was the *raison d'etre* of those discussions? Surely they did not expect to bring better evidence than a Departmental Committee with unlimited funds at its disposal had brought forward. Were they going on entirely ignoring the findings of the Committee? He held no brief for Willesden, although he had had the pleasure of serving in that locality for many years, and he was not at all connected with the evidence that had been given before the Committee, but prior to the inquiry he had studied the question of the intercepting trap, primarily because he considered that the shape was wrong, and as a building surveyor in the neighbourhood of Willesden for some years he had the opportunity of examining a number of houses and testing these intercepting traps with actual excreta under ordinary conditions. They were in drains which had been properly tested and properly laid, and in the course of his experience he found a number of these traps choked, primarily with paper and rags, and only on one or two occasions was it due to the stopper falling into the trap itself. He had found that cement had

set in the traps, simply because the manhole covers were not put on at the time the drain was laid in many districts, and in some cases the depth of the water area was only $2\frac{1}{4}$ inches in the trap. When he tested with a 2-gallon flush, or ordinary fixed bath, he had never succeeded in removing the excreta and paper; also when he tried a 3-gallon flush it was only occasionally that that was possible, even after several flushings: but in every case where he tested with a pail of water or a pail of slops the excreta and the paper were entirely cleared.

That brought them to a very important point in regard to the means adopted for flushing closets. Whether interceptors remained or not, there was room for great improvement in the present methods. He had twice seen rats pass through traps, and therefore they must disabuse their minds of the idea that this trap was a perfect barrier against rats. This was a most serious problem, especially when they had shallow-seal traps beneath closets on the ground or basement floors. In a large number of cases intercepting traps would be omitted after this report, and for many reasons that would be a benefit. He admitted there were reasons which would lead one to the opposite opinion, but the majority of the evidence was in favour of omitting the trap. If they removed the trap they must give some additional barrier against the rats, by providing a double trap to every water-closet in a house, which they practically obtained by syphonic and valve-closets. They should not pass lightly over the evidence which had been given before the Departmental Committee. The witnesses had no axes to grind; they were asked to give impartial evidence, and their status in the profession was sufficient to carry great weight, not only on the question of intercepting traps, but in regard to sanitation generally the evidence was of importance. That in connection with the discharge of gases from flowing sewage was particularly useful. It clearly pointed to the fact that splashing was the primary cause of the discharge of offensive gases, not only in drains but in sewers. One of the witnesses said that sewer gas was not to be feared if it gave off no odour. That did not coincide with an experience he had with an assistant in going through 580 ft. length of 3 ft. barrel sewer. They both found their lights beginning to burn dimly when they were about a quarter of the way through, and his assistant wanted to stop and rest, but he (the speaker) managed to push him on in front and succeeded in getting him out at the other end utterly exhausted. The sewer was perfectly inoffensive, but it was a proof that there were dangerous gases notwithstanding, and therefore that particular part of the report should be taken *cum grano salis*.

MR. W. D. SCOTT MONCRIEFF (Chertsey) said it was not possible for those who were advocating the getting rid of the disconnecting trap to ignore such arguments as had been given that night by Mr. Cooper and Mr. Johnson. His recollection went so far back as the first introduction of disconnecting traps in Scotland, by Dr. Fergus, of Glasgow, forty years ago, and the idea of disconnection was so clear in the mind of the sanitarians of that time that

it was taken as a matter of course. It was done in the belief that sewer gas was dangerous. If there was no danger in air that escaped from sewers, then little was to be said against getting rid of the trap, which in its very nature had certain mechanical and obvious disavantages. But that was a very large order. On the strength of the evidence which had been available, they were asked to believe that for all practical purposes sewer gas was a negligible quantity as regarded health. It was generally recognised that the ventilation of sewers was as yet an unsolved problem, but the disconnection of the sewer from the house was accepted as an absolutely solved problem. It seemed to be a very dangerous proceeding to fly in the face of what they had at present, and take the serious step of making a great alteration on evidence which very likely might be upset before many years. The Institute ever since it was started committed itself to this system of disconnection, and if they adopted the views of the committee it might very likely happen that later on, through no fault of these bacteriologists and chemists, but simply from the state of knowledge at the time, some other terrible creature with a long name might be discovered, and then it would be said intercepting traps must be put back again until a disinfectant had been developed to deal with the new discovery.

What Mr. Cooper had said as to the difficulty of analysing the actual pathogenic conditions connected with a particular smell was well known, and Dr. Rideal, in his text book, referred to the fact that they might take an exceedingly small quantity of broth or gelatine put it into sterilised water, and with a suitable organism produce a most offensive smell. On the other hand, they had the statement from one of the gentlemen who had just spoken that he and one of his assistants nearly lost their lives in a sewer that had no offensive odour at all. One might very fairly challenge any of the medical men who had signed the report from the bacteriological point of view or had supported the view by the evidence they gave, not to take a person who was accustomed to sewers, but to take a delicate patient, liable to sore throat, subject him to a whiff of sewer gas, and see what he would say about it. There were a vast number of people in the country who were not strong, and in many situations where there were steep inclines, as in London, under certain conditions of the atmosphere they would have a passage of very foul gas from the ventilating pipes very near the level of the rooms in which nine-tenths of the people of London were sleeping. Putting one gas against another there was little to choose between them, but he would prefer not to have sewer gases at the level of the part of the house where he slept, which was a condition when the vital forces were naturally lower, and less able to withstand them. It was not for him to speak as an expert bacteriologist or medical man, but it had always appeared to him rather curious that certain experiments made many years ago by an Italian bacteriologist had been ignored in connection with this branch of sanitation. He proved by experiments on animals that were immune by inoculation from enteric fever that their immunity was destroyed by being exposed persistently to the presence of

sewer gas. If an immune animal could be rendered liable to enteric fever, how liable might a large number of the more delicate population of London become from the intrusion of these gases it was impossible for anyone to say.

Dr. C. Porter (St. Marylebone) said he spoke as a medical officer of health. At the last sitting three medical officers of health addressed the meeting, two of whom were in favour of intercepting traps, whilst Dr. Butler spoke against them. He agreed with Dr. Butler, and like him had been brought up in the orthodox faith, but before he ever heard of the Departmental Committee his orthodoxy began to be shaken as the result of his work in the Midlands, and more especially in Leeds. They might gather from the report that Leeds was a trapless town, but that was not quite so. The by-laws called for intercepting traps, and when he was there he had to bring pressure to bear on owners to introduce them, and he also had to listen to the complaints of inspectors and others in regard to them. Living in Leeds there was a natural tendency for one to become heterodox, and he remembered some time ago saying to Dr. Parkes that he saw no necessity for the Committee because he did not think anyone really believed in the trap. Dr. Parkes replied that a great many people believed in the trap, and that he himself did. Dr. Parkes drew a terrible picture of the typhoid bacillus finding its way through the soil pipe and down drawing-room chimneys, which staggered him, but it did not stop him believing in the accuracy of his own conclusion that the trap was really no protection at all; that it was an apparatus difficult to choose and to lay; that it was so constructed that it was difficult to flush; and that it would act mainly as an obstruction in the drain to which it was attached. Dr. Boobbyer said he believed in the intercepting trap because in the case of the far-famed Nottingham Park the traps of the water-closets dried up and they got smells into the houses; and Dr. Parkes's reason for being in favour of them was, in addition to what he said about the typhoid bacillus, that Mr. Patten Barber in his experiments used artificial fæcal matter which contained clay. Neither of these speakers (who, he regretted, were not present) gave one valid reason in favour of the intercepting trap, and he would prefer to stick to the logic of the report which Mr. Boulnois had so very ably summarised.

Mr. A. A. G. Malet (Local Government Board) said he did not think he was letting out any secret when he said that two of the members of the Departmental Committee were brought up in the orthodox style. They were told that the report they had issued was not orthodox, but he could only say that they followed what they thought were the conclusions shown by the evidence before them. Their report was not written either to bolster up or to pull down the intercepting trap, and he was surprised to hear some speakers claiming the report as something written precisely on their side or against the other side. The Committee had absolutely no intention of taking up a position of that kind,

they had no wish to show any preference either one way or the other. Speaking personally, it seemed to him that one of the most important points in the whole report was that if the evidence was true, sewer air was less dangerous than drain air. He did not wish to say that sewer air was not dangerous at all, he only said it was less dangerous than drain air. If that was accepted it followed that a combination of sewer air and drain air could not be worse than drain air alone, and that practically meant that in ordinary circumstances the need for an intercepting trap was not vital necessity. Then they came to circumstances under which an intercepting trap might be necessary. These would depend on local conditions, and, in consequence, it should be left to the local authority to decide whether a trap should be placed or whether it should not. One speaker had welcomed that recommendation, and it was quite a natural conclusion to come to. If they accepted the fact that sewer air was less dangerous than drain air, then the fact, to which one gentleman had referred, that traps might evaporate and sewer air emanations get into the house in consequence, did not appear to be very important, because, taking the case of a drain serving a series of flats, they would still get emanations from the drain into the house, and if sewer air was not so dangerous as drain air, and the trap was taken away, they got both sewer air and drain air in, and that did not make it any worse than getting only drain air. The vital point of the whole thing was whether sewer air was less dangerous than drain air. What they found in the course of their investigations was that if there was any undue pressure in a drain it was only the weakest trap that gave way, there might be twenty traps on a drain, but in case of undue pressure it was only the weakest trap that would go, the others remained unaffected. He had not considered what should be done if the trap were taken away; but a weak trap might be put on the drain; they might take the lowest connection from the closet, and might insert a puff pipe between the ordinary house-fitting trap and the connection with the soil pipe, and if they had undue pressure this weak trap would go, and the emanations would pass through the puff pipe into the open air, or wherever they liked to take it. It would be less dangerous than going into the house. No one wanted sewer air or drain air in their house, it was a thing to be avoided by all possible means.

A lot of the evidence went to show that sewer air was chiefly dangerous from the point of smell. In their report they drew particular attention to the question of smell, they said that every means should be taken by the local authority to see that no smells should occur, and that no sewer air or drain air should get into a house, and they suggested in one place that cast-iron pipes should be used. The two most important points were those relating to smells and splashing. It was an important object to keep the drains airtight, and to see that smells should go where they would do the least possible harm, and they could not be too careful in considering where the upcast shafts were taken to; they should be taken to places where the least possible nuisance and inconvenience was caused. In regard to splashings, it was an accepted fact that

splashing was dangerous in foul air, both in regard to the smells and the organisms that were given off. In the case of a sewage filter sprinkler, if the sewage was at all septic or foul, the greater the spray the greater the smell. The evidence they got from Germany rather impressed him. There, all pipes, owing to climatic conditions, were taken up inside the houses. They were told that only one town (Cologne) ever had intercepting traps, and they had become such a nuisance that they had been taken out. They also learned that whenever earthenware or stoneware pipes were laid they always made the joints with some bituminous compound and not with cement, which might be a point worth considering.

The specific gravity of the artificial fæces used in the experiments was only slightly greater than that of water, a few of the pieces floated.

The city engineer of Manchester brought an accusation against our committee in that after he had, at our request, prepared a précis of the evidence he would be prepared to give, we had not called him. We only called a few of the gentlemen we consulted in this way; but, in the case of Manchester, the city engineer called on our secretary and told him that as Professor Delépine was then employed by the Corporation on an investigation of the effect of sewer air, etc., and was about to issue his report, the mouths of the city officials were closed until this was done. We therefore were unable to call the city engineer, and we had closed the stage of taking evidence before the Manchester report was issued.

MR. FREDK. OSBORNE SMITH (Westminster) said the report was somewhat perplexing, and deserved careful consideration. One thing was certain: they must reconsider their present ideas on drainage. That did not mean that they were to accept the evidence and the conclusions deduced therefrom without question. He took exception to several points: for instance, the removal of the fresh-air inlet to overcome one of the disadvantages of the interceptor. That would be fatal in several ways; in a house with a soil pipe chamber, ground floor w.c., and a mica flap fresh-air inlet. The top w.c. was flushed, the air was driven in front, where could it go? The mica flap prevented exit there so it went through the ground floor w.c. trap and drove the water of the trap in front of it. How much more would that happen without any inlet. This had happened several times in his own experience. Another instance in the report was the sealing down of the lower portion of the drain so that a stoppage might become evident sooner than it did under the present arrangement. Assuming that a stoppage had occurred in the trap, how was it to be removed without flooding the brick chamber? One of the advantages claimed for that sealing was to prevent the flooding and consequent objectionable removal.

To consider the interceptor itself: It was shown that it frequently became stopped. Why? Some said it was because dirt, etc., entered through the

fresh-air inlet, but if so the inlet was obviously in the wrong position; others said it retained legitimate solids in such quantities that they stopped it. In that case two factors were obvious; either there was an insufficient flush of water, or the velocity was so small that there was no force to carry the solids through. That could be increased in various ways, which might be adopted. The quantity of water might be increased. This was sometimes difficult, but might be counteracted by reducing the size of the trap, which would increase the velocity through the trap; and the inclination of the drain might be increased, which would also increase the velocity. Most of the traps which had been found to be stopped would also be found to be too large for the amount of sewage that was to pass through them, and the drain was laid with too little fall; he had found that to be the case in numerous instances. He used a trap which would give better results than those experimented with. Interceptors and drains had generally been too large; until recently it had been considered essential to have 6-in. drains and interceptors for all main house drains, and these were the cause of half the trouble.

The interceptor was said to contain decomposing sewage which caused the smell in sewers. Where did that decomposing sewage come from? It did not come from the water-closets, because that sewage was fresh and clean water was used to flush it out of the closet apparatus. It came from the gullies which received the waste from scullery-sinks, baths, etc. These gullies were rarely cleaned out and rarely flushed, and they all knew how offensive they became. The waste-pipes were lined with a filthy slime which was quite as offensive as the soil-pipe, if not more so, and yet they had abolished the traps at the feet of soil-pipes long ago and retained those at the feet of waste-pipes, which were literally young cesspools. The interceptors, which used to be at the feet of soil-pipes, were clean as compared with the present gullies. Many of those gullies were actually selected because they retained the filth. They had long since made their waste-pipes with pipes and joints similar to those used for soil-pipes except in size. Why not treat them as soil-pipes, they were every bit as foul, and remove the cesspools at their feet? They would then have the full value of their discharge to flush drains; there would be fewer traps to become broken and defective by frost or otherwise; and retain only one trap, the interceptor, to protect them and their houses from the foul air of other people's drains. All sewers were not as clean as they ought to be, and it was unfair to judge all sewers by those which were clean. There were, he knew, sewers as sweet as could be desired; but others, well, the least said about them the better. He wondered if all the advocates of the abolition of the trap had sewers beyond reproach. He feared not. He had no wish to mention places, but he knew of some which were practically half full of silt. Were they to ventilate those elongated cesspools through their house drains? He hoped not. The report said in some cases the trap would be necessary, and why, then, not take the bull by the horns and see that they got an efficient

trap, and then they would rarely hear of stopped traps. Ventilating drains, by flushing them with foul air from other people's drains, did not appeal to him. There was plenty of fresh air; let them pass it through their drains to sweeten them and dilute the foul air which might be in them. In order to do that they must have the fresh-air inlet at a low level and not above the roof. In the event of the fresh-air inlet acting as an outlet, it would generally be of short duration. The fresh-air inlet was often the scapegoat of the scullery gully which he had referred to, and which was frequently adjacent to it in front areas of town houses.

MR. A. J. MARTIN (Westminster) said that he had listened to the interesting discussion the previous week in the hope of getting from the supporters of intercepting traps some real arguments in favour of the trap, but he had been disappointed. The point every engineer aimed at in laying a sewer was that it should be self-cleansing; that the liquids and solids should pass through it instead of lodging in it; and that it should be self-cleansing also as regarded the air it contained. They took care to lay their sewers and house drains up to that standard, and then they put in a contrivance which held back a large amount of decomposing solid matter and brought about stagnation in the air of the drain and sewer. What impressed him most in the discussions he had heard, was the straits to which the advocates of the trap were reduced in their efforts to justify its existence. They had had an eloquent disquisition that evening as to the danger of sewer air getting into a dwelling house if they left out the intercepting trap, but who in his senses was going to put up a ventilating pipe in such a way that sewer air could get into the house? Looking at the matter as a whole, there was no doubt the objections to the trap were real, whilst the advantages claimed for it were problematical; and it seemed to him a very heavy blow had been dealt at the idea that the trap was a necessity in all cases. Advocates of the trap said that the objectionable conditions to which it gave rise were due to bad types of trap, or to improper setting, but they pointed to defective drains and improperly placed ventilation pipes as necessitating the retention of the trap. They were not entitled to assume a higher standard of workmanship in the one case than in the other. They could no more count on all traps being properly fixed than on all house drains being properly laid.

It had been gravely suggested in discussions elsewhere that inasmuch as the report condemned the intercepting trap, steps should be taken to secure the removal of the traps already in use. It seemed to him that any such action would reflect very seriously on the sanity of their profession. Sanitarians would stultify themselves if they attempted now to make people root up a thing which, down to a few days ago, they were compelling them to put in. The report contained nothing to justify any such proceeding. It simply pointed out that, on the whole, the disadvantages of the trap in ordinary cases outweighed its advantages. The logical course would seem to be to give local option to

householders to say whether they would have traps or dispense with them. Valuable as the report was, he did not consider they ought to build up far-reaching conclusions as to the innocuousness of sewer air on so small a foundation of fact. He accepted the investigations absolutely so far as they went, but he did not think it was safe to rely altogether on bacteriological and chemical analyses as showing that sewer air was harmless. They ought also to have regard to results, and it would be worth while to secure evidence from more than the forty or fifty gentlemen who had been before the committee.

Mr. A. P. I. Cotterell (Westminster) said that listening to the discussion from those who advocated the retention of the trap, he could not help feeling that there was a great deal in the expression used by one speaker, namely, that there were sewers *and* sewers, and he thought it was because of that that they had found it necessary in some cases to retain the use of the trap. Personally, he would very much prefer to do without the trap, and where they had a properly laid system of sewers they did not need it; but it was because in many of our older towns and cities we had the old-fashioned drains and sewers, sewers which in themselves were elongated cesspools, that they were obliged to retain this antiquated arrangement to cut off the householder from the sewer. There might be something in the argument that the householder had a certain amount of control over his drain, but he had none over the public sewer; but that was an argument that might very well be carried too far. He knew, and he supposed they all knew, of cases years ago of men who absolutely refused, as long as they possibly could, to have a connection made between their drains and the sewer on the ground that it was more dangerous than having a cesspool on their premsses. That objection had disappeared because of the improved conditions of their sewers and it was when they improved their sewers so that they were not elongated cesspools that they would find householders willing to abolish the intercepting trap.

The importance of care in house fittings had been emphasised by Mr. Jennings, and he thought that in that direction much progress might be made. The drains were things which the ordinary householder liked to think as little about as possible, and how many householders thought of having a regular inspection of their intercepting trap? Even the local authorities themselves, except in one or two exemplary districts, did not pay regular attention to the house traps, and yet it was very important that they should be carefully attended to to see that they were clear and in good order. As to the cement getting into the traps when the drain was laid, that was a thing that should have been prevented by the local authority. With regard to fresh-air inlets he looked upon them as an abomination. They were placed just in the position where they can become most obnoxious, and for his part he preferred to have them stopped up. With regard to ventilation it would appear, both from remarks in paragraph 76 of the report

and from the investigations referred to, that the introduction of fresh air currents tended to bring about an increase in the number of microbes; in other words, they were creating the very nuisance they were trying to abolish. A clear vent was undoubtedly necessary, and in his opinion that was all that was required. In the present state of public opinion, however, to say nothing of the present state of the law, even with this very strong report in their hands, none of them would be justified in asking for the abolition of the trap, but he thought they might make its use permissive in cases where by-laws were being revised. He did not think they should be so tied down to the retention of the trap in new sewers as they had been in the past. It might be necessary to have them on old systems, but where there were new systems he trusted that permission would be given to the householder to do without the trap if he saw fit.

MR. T. A. GORNIOT (St. Marylebone) said he had had a somewhat varied experience in the building trade, and when he started out his first impressions were that there was no necessity for any traps at all. He constructed drains on this principle, and thought they were right; but when he eventually settled down to a particular branch of the trade and gained further experience and came to the Sanitary Institute to learn, the first thing impressed on him was that the interceptor trap was an absolute necessity. If they did not require an intercepting trap why have any traps at all? They had heard that sewer gas was not so harmful as drain air, and he supposed that accounted for the alleged healthiness of the men who worked down sewers. It was said that the trap was an obstruction to the drain, but did they mean that without the trap there would be no stopping of the drain. When he was working as a boy, he found more drains without traps stopped up than those which had them. He would prefer the air generated by the drain of one house than the accumulated air of a sewer, which had been called an elongated cesspool. A lot had been said about the fresh-air inlet, but if they had a certain amount of decomposition going on in a small area, it was better to have the introduction of fresh air and proper ventilation of the drainage than to have the air of an elongated cesspool introduced to the house. It was said that no one would be silly enough to put up a ventilating shaft where people could breathe the air from them, but in London at the present moment it was impossible to put up such shafts at any reasonable distance from a window. If the intercepting trap was an evil, then he considered it a necessary one. They had by-laws of the County Council which insisted on them trapping a sink, and if they had six or eight feet of waste pipe they must "puff" it, and yet they wanted to do away with the intercepting trap. He considered the best part of the report was that in which iron-drains were advocated. The evil of splashing was also alluded to, but he did not see how that was to be avoided unless they had a spiral pipe, and this again would have defects.

Mr. W. Firth (Hackney) said it seemed that the opponents of the trap assumed that they were in the majority, but if a poll were taken he believed they would be in a tremendous minority. In spite of misrepresentation, and in spite of the pressure brought to bear upon them, the committee had not been able to recommend the abolition of the trap. On page 3, paragraph 9, the alleged disadvantages of the trap were set out, but he thought that was only begging the question. A trap did not block more than any other because it was an intercepting trap, and there was no reason why it should. Then it was said that in Willesden the number of blocks was 1·189, and that in none of them was there any evidence that the block was in existence until the traps were exposed to view. But where was the sewage going? Then the fresh-air inlets were objected to, and he was bound to say that in his experience, in the majority of cases, the fresh-air inlet was placed in the wrong position. It ought to be at the top end of the drain, so that the fresh air could be drawn in by the partial vacuum caused by receding sewage. Then it was contended by the opponents of the trap that it usually contained sewage, and that this tendency of the intercepting trap to retain sewage had a very important bearing on the offensiveness of sewer air. That was not the fault of the trap, but of the people who fixed it, and there was no reason why the trap should contain sewage. There was one point he wished to draw attention to. In the ordinary water-closet the water for flushing was delivered downwards, and the water and excreta were deflected over the weir of the trap, but in the ordinary intercepting trap the water and excreta were delivered horizontally, and if with any great velocity it struck the opposite side of the trap, and in the rebound got the deflection of the water the wrong way. It was deflected towards the inlet of the trap instead of towards the outlet, and hence the necessity of selecting intercepting traps to suit the particular circumstances of each case. In no case should they build a manhole to an interceptor if they could avoid it. If they did away with the interceptor trap they would not do away with the bad air of a drain, for that was largely caused by not having sufficient mean hydraulic depth of water to convey the excreta from the pipe. The ordinary wash-down closet made a big stir, but half of the water went out before the excreta, and two-thirds of the water was through the intercepting trap before the excreta reached it. With the old-fashioned valve-closet there was a large body of water, which was sufficient to carry the excreta right through the trap and into the sewer.

Mr. Boulnois said if he attempted to reply on the discussion it would mean keeping them for hours. He did not think they were any nearer a conclusion than when they started, but the discussion had been useful. If the trap was to go, and he thought it would, what precautions were they to take beyond those they had already to substitute for the trap? First of all their sewers must be reconstructed, of proper size, with proper self-cleansing gradients, and with sufficient ventilation. The drains must be connected at a proper level with the

sewer in order to avoid splashing, which was a most important matter; they would have to be very carefully laid, the danger from leakage being greater. The soil pipe must be most carefully constructed and connected with the drain; all sinks, baths, rain-water pipes and wastes must be disconnected and trapped; the water-closet must be doubly sealed. Then again, if the trap was to be done away with he thought they would find that iron pipes would come into almost general use. There was a sense of security about an iron pipe, with its fewer joints and stronger material, which would make him happier to live in a house so fitted. What he did hope would happen was that they would get an improved flush; he believed half the evil had arisen from the ridiculous 2-gallon flush; it was a retrograde step of the Water Company and of the Water Board to give a 2-gallon flush. The result was that people flushed the water-closet two or three times and used 6 or 8 gallons of water instead of 4 gallons, which should be the flush, or three at the least; a 2-gallon flush was absolutely insufficient. Of course the Institute could investigate further, but was it worth while? They had a Committee which, without fear or favour, had investigated the matter for four years. They had examined a number of witnesses, but on that point he regretted that they did not examine more sanitary inspectors; they only examined two. They had had several sanitary inspectors taking part in that discussion, and he must say they were very practical, and, indeed, almost more practical than anyone else who had spoken. After the Committee had done all this work what further work could the Institute do, and what was the use of pressing it further.

Mr. Martin suggested that they should send a circular to all the surveyors in the country, but what would be the result? Half would write and condemn the trap, and the other half would write and say they would not do without it, and they would be no further. He thought they must accept it that the trap although not absolutely condemned, was found in places to have caused trouble, and therefore in the future the by-law must be permissive, and the Local Government Board would have to withdraw their prescription and it must be left to the officers responsible for each town to deal with the place on its merits and act accordingly. If the trap was done away with they must secure additional security. Personally, he was brought up in the belief that the trap was a safeguard against a common enemy, the public sewer. The object was to keep their neighbour at arm's length, because if there was any truth in the germ theory, it was felt that germs might pass into their own drain and poison them. Notwithstanding that the report said that sewer air was practically the most wholesome that could be breathed, and that the microbes were really obtained from the air itself, they had to remember this; they had been struggling for sanitation for forty or fifty years, and the proof of the pudding was in the eating. What had been the result? No one could deny that people were healthier than they were, and everyone knew there was less zymotic disease and that was undoubtedly largely due to the improvement in the sewers and drains.

Mr. W. C. Tyndale (War Office) wrote:—He agreed with Mr. Boulnois that the report was a most useful one, as apart from the question of the use of the intercepting trap, it threw light on other matters, and stamped with official recognition certain views with regard to sewer air, etc., which hitherto had not been generally accepted.

It was satisfactory to feel that their useful servant, but half enemy, the sewer, was not quite the bad character that it had generally been believed to be, and that its breath, although offensive, was not necessarily deadly. Personally, he was glad to find that the use of iron pipes for house drainage was looked upon with favour, but, on the other hand, he had wondered at the light-hearted suggestion that a way to get over the charging with sewage of a disconnecting manhole, when the trap became blocked, would be to continue the drain from the trap, through the manhole by a closed iron pipe, with a lid provided for the clearing out of the trap. It had evidently not been considered what would be the result of opening the lid on a surcharged drain, to get at the trap. It might possibly result in an inquest on the operator, with a verdict of "found drowned."

No, this was no remedy for the flooding of the manhole. A better course would appear to be to put up with the surcharging, and to have the socket of the clearing arm fitted with one of the best forms of locking stoppers, actuated by a chain from the top of the manhole. The Committee had considered this arrangement, but offered the objections that such stoppers were expensive, and that they might become defective, and fail to act; but as to this he might say that excellent stoppers were to be obtained, which cost only about 5s., and were practically proof against corrosive action.

A great deal had been said as to the tendency of a trap to retain the solids of sewage, and in the report of the Committee it was stated that experiments showed that with a 4-in. trap from 52 to 67 per cent of solids were retained, and with a 6-in. trap from 73 to 78 per cent., with a 2-gallon flush. Dr. Parkes had shown how misleading such results might be on account of the nature of the artificial solids used in the experiments. They all recognised that traps did retain solids, and Mr. Boulnois had pointed out that the drains also did the same; indeed, it was common knowledge that this was the case. No one that he ever heard of had ever suggested that a 2-gallon flush was expected to remove the solids at once through the drains and trap to the sewer. But he should like to draw attention to the fact that while fresh sewage was arriving in the drains and trap, previously arrested solids were simultaneously being carried along the drains, and out of the trap, to the sewer, so that the arresting of solids was of short duration, and practically no decomposition in the trap and drains took place. Any one unacquainted with the working of a good system of drains would imagine from statement which have been made that all the percentage of solids left in the trap never passed out till broken up and decomposed, and that the trap and drains were congested with a mass of putrid sewage.

He suggested that by far the greater number of cases of blockage were caused by the falling into the trap of the stopper of the clearing arm, and by the admission of foreign substances. As to the first, he had stated that this might be obviated by the use of a proper stopper, while as to the second, his experience, which was extensive in connection with all classes of dwellings, taught him that certain details of a drainage system offered opportunities for the introduction of articles which would stop up almost anything, to say nothing of a trap. This was more particularly so in the case of the dwellings of the lower orders, and it was in connection with the trap at those dwellings that the greater number of blockages were usually found. The women frequently emptied pails down the water-closets without always knowing what the pails contained, and rags, bits of hearthstone, small brushes, etc., were passed into the drains. The children also, having so little space and opportunities for amusement, seized with delight the opportunity afforded by a grating of any sort to push in pebbles, sticks, and, in fact, anything they could lay their hands on, and they not infrequently lifted the grating of a gully and endeavoured to stop it up. He was of opinion that if the authorities would turn their attention at least to the better covering of gully traps, the locking of the gratings, and the putting out of reach of children the fresh-air inlets, the percentage of stoppage of traps would be considerably reduced.

In the case of the married quarters in barracks, the regulations provided for the fixing of a special slop water gully close to the back entrance, and these had proved of great advantage in the prevention of the stopping up of traps.

Mr. Boulnois said that "our long cherished belief in the efficacy of the trap has been rudely shaken." He did not agree. It all depended upon what was expected of the trap. His view had always been that its main object was to shut off from the house drains the very foul air from the sewers. He was quite content to believe, and welcomed gladly the statement, that sewer air was comparatively free from microbes, but on the other hand, he could not agree with the suggestion that sewer air was less foul than that of house drains. (Of course, he was speaking of a proper system of the latter.) It was common experience that it was frequently possible to tell on opening the manhole on a house system whether there was a trap on the outlet drain, or whether the stopper of the trap was in its proper place, as if not, the drains were found to be charged with that peculiar and highly offensive odour, which was easily recognisable as sewer air. The enormous difference between the atmosphere in a good system of house drainage and that of the sewers, convinced him that whatever an intercepting trap might not do, it at any rate freed the house drains from most offensive smells. It was true that drain air was offensive on the discharge of a water closet, but these conditions were only intermittent, while the offensiveness of sewer air was perpetual. He could not contemplate with equanimity the laying on of highly offensive air to a system of house drains, which otherwise would be inoffensive,

nor the possibility of causing the soil and ventilating pipes to become the disseminators of sewer gases at altitudes and in positions which were recognised to be suitable for house drain ventilators.

He considered that the omission of the intercepting trap would have the most disheartening effect on all those whose aim and object it was to provide, and maintain, clean and comparatively inoffensive drainage systems, as without a trap all such efforts would be in vain. In his opinion any legislation having the object of abolishing the use of the intercepting trap would be the first retrograde step in domestic sanitation, and a grave one at that, since this became more or less a science.

Mr. W. Kaye Parry (Dublin) wrote:—For the last thirty years he had a very extended experience as regarded intercepting traps on house drains.

During that period he had issued from his offices four thousand five hundred reports upon the drainage of houses, institutions, hospitals, and other buildings. Each one of these reports had been based upon a careful and thorough examination of the drainage, together with the application of the usual tests. More than half of these inspections he had made personally, and the great majority of the remainder had been made by his partner.

During the same period the drainage of some one thousand five hundred and fifty buildings had been completely reconstructed under his supervision and that of his partner and staff, and in respect of each of these new systems of drains a certificate had been issued to the effect that they were satisfactory.

In each case where a certificate had been issued an intercepting trap had been provided, and in all instances the drain had been subjected to the water test. A stoppage of the interceptor would, therefore, be speedily followed by the flooding of the low-level yards and areas, thus causing great discomfort to the occupants. It was not unreasonable to infer that had such occurrences been experienced, he would have been made aware of the trouble in view of the sanitary certificate.

Some of these certificates dated back as far as 1884, and yet he was unable to recall one single instance in which a complaint had been made of inconvenience caused by such stoppages.

Of the four thousand five hundred inspections made some eighteen hundred had been re-examinations of houses previously inspected, and he had never yet come across a drain gorged by a choked interceptor.

His experience led him to the opinion that when a proper type of intercepting trap was used, and when the drains were properly laid, graded, and flushed, the interceptor did not get blocked.

If these traps were abolished it would be impossible to provide fresh-air inlets on house drains, and without air inlets house drains would be always more or less foul, even if they were provided with upcast shafts. It was the free

passage of pure air through these drains which kept them sweet and free from smell. When either air inlets or outlets were obstructed, the air in the drains was always found to be offensive, and complaints were made of bad smells.

All modern house drains had inspection chambers, and some of these chambers were in small confined areas and yards. Occasionally the covers of these chambers were lifted when inspections were being made or for other purposes, and in the absence of intercepting traps, all the foul gases of an evil smelling sewer would then be released in closest proximity to the dwelling.

Whatever benefit might accrue, as regarded the better ventilation of public sewers by the abolition of the intercepting trap, it would involve the sacrifice of the most important features connected with the perfect sanitation of the individual houses.

If trouble was experienced in some towns from stoppages in intercepting traps, the remedy consisted not in the abolition of the traps, but in the reconstruction of the house drains on more perfect lines.

His experience led him to believe that the intercepting trap was an effectual barrier against the incursion of rats. They were very seldom found in well-drained houses, and when they existed their presence had almost invariably been traced to incursions from adjoining houses where the sanitation was imperfect.

Mr. P. Dodd (Wandsworth) wrote:—There was evidently a great diversity of opinion as to the necessity or otherwise of the intercepting trap, and he was one of those who had held the opinion that from an engineering point of view the intercepting trap was not a necessity, but he had always been led to believe that from a public health aspect it was an absolute necessity, and ought to be retained, because, amongst other reasons, the trap was a seal against disease germs passing from an infected sewer or house drain to the non-infected drain of a neighbouring house. Moreover, it prevented the foul air of the sewers from escaping to the house drains. But, according to the Report of the Departmental Committee of the Local Government Board, the use of the intercepting trap was not a necessity on bacteriological or epidemiological grounds, and again it stated that it was a well-known fact that soluble gases could be taken into solution on one side of a column of water and given off on the other. Under these conditions they had foul sewer and drain air on both sides of the trap.

The question was no doubt one of serious public health importance, and it seemed to him that before taking up any drastic measures further investigations would be needed.

In the borough he represented they had at least 50,000 traps fixed on house drains, and it would not only be inexpedient but unreasonable to ask the owners to remove the traps which they had been compelled to provide under the existing by-laws.

Seeing that the report stated that the offensiveness of sewer air was some

times pronounced, it was obvious that the real point was to get rid of the foul air both in the sewers and house drains. The report stated that

> "It is obviously important that public health authorities should make every effort to secure that both sewers and house drains are so designed and constructed that the opportunities of their contributing smell to the atmosphere shall be reduced in every possible way."

It seemed to him that the best way, not only to reduce but to abolish the smell was, if possible, to prevent the sewage from becoming septic, and at the same time to cause the drains and sewers to be filled with fresh air.

If the intercepting trap was to be retained, then the best type should be adopted, standardised, and approved by the Local Government Board.

Professor Bostock Hill (Warwickshire C.C.) wrote:—He could not help feeling that in some quarters at least there was a tendency to advise getting rid of the intercepting trap too hurriedly. The report of the Departmental Committee was interesting and valuable, but did not appear to him to be conclusive. The one great fallacy underlying appeared to be the suggestion that all sewers and drains were of the same type, while, as a matter of fact, the conditions existing in different localities were widely different. It had been quite customary for many years to sewer recently developed districts on the separate system, and particularly in those places where the sewers were of necessity rather flat. Those sewers much more closely approximated to drains in their character, and could not be compared with the large sewers of London and many other towns.

He had had for thirty years a large experience of that type of sewer. He believed he had seen more than one instance when the absence of an interceptor had caused injury to health as well as nuisance to householders. He was not, in consequence, prepared to advise local authorities to abolish those traps, but rather to attempt to discover in each case where they had been the cause of complaint, why such complaint had arisen, and how they could be remedied.

He endeavoured to show before the Institute some years ago that the unnecessary multiplication of traps was an evil, but the complete abolition of interceptors was a totally different thing, and one which should not be universally accepted as sanitary practice on the evidence at present submitted.

Sir Maurice Fitzmaurice, at the opening of the meeting, referred to the recent death of Dr. Darra Mair, who was chairman of the Departmental Committee appointed by the Local Government Board; and a vote of condolence with Mrs. Darra Mair and family was unanimously passed.

THE ROYAL SANITARY INSTITUTE.

REVIEWS OF BOOKS.

Modern Sanitary Engineering.*

This book will be welcomed by those who consider that knowledge of sound principles of sanitation is an essential precedent to the study of details.

Lecturers can readily be found who talk about or read to students accurate descriptions of appliances, drainage, sewerage, fittings, etc., without explaining why sanitation is required, and why the drainage or fittings are suitable and adapted for the intended purposes. In this book explanations are freely given, and the author truly observes that root principles must be studied and no tradition regarded as too venerable to be criticised; he fairly approaches the various problems in a scientific spirit with an open mind, fortified by practical experience.

The contents are exceptionally well arranged for reference by architects, lecturers, sanitary officers, and students. The burning questions of disconnection, sewer ventilation, duplication of pipes, testing, sewage disposal, etc., are treated with discrimination and knowledge.

Some of the illustrations could be improved, *e.g.*, figs. 34, 37, and 50.

J. O. S.

The Task of Social Hygiene.†

The study of social hygiene means the study of those things which concern the welfare of human beings living in societies. As practically all the dwellers on earth live in societies of one or another sort, social hygiene has to do with the welfare of the entire human race; but Mr. Havelock Ellis in the book under review has necessarily limited his purview to the civilised societies of the present day, and the problems presented by the most modern developments on the social side.

Among the subjects considered are the changing status of women, the significance of a falling birth-rate, eugenics and love, religion and the child, the problem of sexual hygiene, immorality and the law, war against war, and individualism and socialism. It will lead us too far afield to comment on Mr. Havelock Ellis's treatment of all these subjects, and, indeed, the book requires careful reading throughout, if it is desired to obtain a full comprehension of the author's views on these matters, which constitute some of the leading questions of the day.

On the question of the falling birth-rate Mr. Havelock Ellis is decidedly not one of those who regard this factor in our social development as a sign of present-day selfishness and lack of patriotism, leading to national weakness and

* Modern Sanitary Engineering. Part I.: House Drainage, by Gilbert Thomson, M.A., F.R.S.E., M.Inst.C.E. 266 pp. 8vo. London, 1912. Price 6s.

† The Task of Social Hygiene, by Havelock Ellis. 414 pp., 8vo. London, 1912. Constable and Co., Ltd. Price 8s. 6d.

decay. The birth-rate, he is of opinion, was high in the early industrial period of the past century because of the selfishness of parents and the absence of social-economic restraints. There were then no laws against child-labour, and the little children were sent to the factories and the mines to increase their parents' incomes. The birth-rate began to fall when a higher standard of living and a finer economy of life had been adopted as an ideal by the working classes, the result of the diminishing birth-rate showing itself in less disease, death, and misery, and an improvement in the quality of the future race. This view of the matter is undoubtedly supported by the fact that amongst Western nations the birth-rate has fallen, or is in process of falling, at the greatest rate in the most highly civilised communities. In backward countries, such as Russia, where there is a high birth-rate, and little or no evidence of its diminution, there is also a high death-rate, and the natural increase of population is only effected with much friction, misery, and death, and the mass of the population remains in a condition of low social organisation, with little prospect of improvement.

It is, perhaps, however, too early as yet to predict with certainty that the quality of the future race will be better in the case of the highly civilised nation, whose natural increase is due to a low birth-rate, associated with a still lower death-rate, than in that of the nation of lower organisation, whose natural increase is due to the excess of a high birth-rate over a high death-rate. In the latter the increase is accompanied by a huge wastage of infant life, which the former is spared; but the experiment has not yet proceeded far enough to show that the modern method of increase, which produces relatively few infants but spares their lives, is destined to produce a hardy and virile race, fit to compete both in *war* and peace with the survivors of the older method of increase, which has been nature's method of propagating the human race in all past ages until comparatively recent times.

On the question of war and a conscript army, the following paragraph is worthy of quotation at the present time:—

"Thus it is that there can be no question of disarmament at present, and that there can be no effective international tribunal unless it has behind it an effective army."

Armies must continue to exist apart altogether from any question as to whether they are schools of virtue or vice. Professor Guérard, who served in the French Army, is quoted as denying that an army is a school of all the vices, but he is unable to see that it exercises an elevating influence on any but the lowest. War may be a stern school of virtue, but barrack life is not. How far we could improve in England over the barrack life in France for any conscript army we may in future form, remains to be seen. L. C. P.

Health Books for Nurses.*†

Our last issue contained a review of Dr. Hutt's text-book, which covers the whole syllabus for women health-visitors and school nurses, laid down on pages 24-5 of our Institute's examination handbook. The two books now before us cover between them much the same ground. But they are independent pro-

* Hygiene for Nurses: Theoretical and Practical, by Herbert W. G. Macleod, M.D., M.R.C.P., D.P.H. 233 pp. London, 1912. Smith, Elder, and Co. Price 3s. 6d.

† Feeding and Care of Infants and Children, with special reference to cases of difficult digestion, by Nurse Hughes. 120 pp. London, 1912. Simpkin Marshall, Hamilton, Kent, and Co., Ltd. Price 2s. 6d. net.

ductions by different publishers, one written by a medical lecturer, and the other by a nurse. The latter, which seems naturally to deal with the more human part of the subject, is confined to the physiology, ailments and care of children, so that the physiology and care of adults are not represented in either book. The total absence of the human, physiological side of hygiene in the former work detracts considerably from its merits; for the title obviously implies some account of school-nursing, which is not even mentioned. Moreover, even the subject of supreme importance in the health work of nurses, infant feeding, is dealt with in a very sketchy way, with few definite facts and no striking suggestions. Nor does a lecturer fulfil the paramount need of impressing the value of breast-feeding when he only says parenthetically, "mother's milk is the best food for the infant, and it ought to be given unless" . . . . etc. On the other hand the author does not, like Dr. Hutt, profess to have given us a text-book; and as a collection of easy lectures to nurses it is very good, running lightly through the older ground, known as hygiene, in simple English and with a well-chosen series of illustrations, some of which are both useful and original. The Appendix of Important Acts is singularly inadequate, the 1875 Act being amongst those omitted.

Nurse Hughes' book is delightfully feminine, as it should be. No male has ever thought of the wealth of detail, here given, as to infant clothing and where to get it, and how to cut it and hem it or knit it. Here is a chance passage shewing the motherliness of the book:—

> "A mother should easily learn to recognise her baby's cries. This is its only language, and with a little patience and sympathy a mother will easily learn to tell from the note of her baby's cry whether he is tired, in pain, uncomfortable, or really hungry."

The feeding chapter similarly strikes us as eminently sympathetic and sound, guarding its readers against the fault of overfeeding, and giving a multitude of practical rules and alternatives; while the difficult question of medicines is well treated. The reduction in temperature of the infant's bath is advocated (although not to the extent that many would now recommend), and there are various useful odds and ends of information in the appendix. But all this useful chatter is unlikely to be read and retained without better classification, arrangement, and distinction of emphasis: and it will not be handy for use as a book of reference. The publishers should give it to us for 1s.; at that price it would merit a large sale amongst nurses and intelligent mothers. F. E. F.

The Prevention of Diseases common in Childhood.*

This small book contains matter most of which appeared originally in dental journals which are little read by medical men; so the writer takes this opportunity of bringing his views before the medical profession. The various chapters deal with Diet in Infancy and Childhood; Open Windows and Adenoids; Oral Bacteria and Acquired Immunity to Disease; Dental Caries; and Infant Mortality. The writer deals with diet more especially in its relation to the hygiene of the mouth, and he takes the view that 20 per cent. of the diseases of childhood would easily be prevented if oral sepsis alone could be prevented. Dr. Sim Wallace speaks with great authority upon the subject of oral hygiene, and his special knowledge and experience lead him to say much which those

* The Prevention of Common Diseases in Childhood, by J. Sim Wallace, D.Sc., M.D., L.D.S. 103 pp. London, 1912. Bailliere, Tindall, and Cox. Price 3s. 6d. net.

interested in personal and public health will read with advantage; but he expresses views on several other subjects which will not receive general acceptance. For instance, the view that adenoids are mainly caused by sleeping in bedrooms with open windows is inadequately supported by some facts which he has collected in reference to 118 children, and these lead him to the conclusion, which he puts in italics, that "adenoids appear to be confined almost entirely to those children who sleep with open windows." Again, as milk is unfavourable to oral hygiene, Dr. Wallace deprecates the advice that nursing mothers should drink large quantities of milk. Indeed, he believes "that the average milk-fed girl does not in womanhood develop such a womanly figure as the girl who has shown an aversion to milk and a preference for more hygienic liquids throughout her life." No medical man will under-estimate the great importance of oral hygiene; but it looks as if Dr. Wallace, by an undue convergence of his gaze upon the mouth, loses perspective. H. R. K.

Report on Isolation Hospitals.*

This report embodies the results of an inquiry carried out by Dr. Franklin Parsons (late Second Medical Officer of the Local Government Board) during the period of his official connection with the Board, into the cost of construction of isolation hospitals, and the general circumstances of their use and administration. As stated by Dr. Newsholme in the introduction, this report may be considered as supplemental or complemental to that of the late Sir Richard Thorne Thorne, issued in 1882, and necessitated by the changes which have taken place of late years in our knowledge and practice as regards the isolation and treatment of acute specific fevers.

The following important subjects, among others, are adequately dealt with, viz., the questions of combined hospitals, of the classes of persons and of cases specially requiring hospital isolation and treatment, of separate hospitals for small-pox, of the system of dealing with cases sent in under mistaken diagnosis, of mixed infection and the like, of the nature and degree of isolation to be practised (*e.g.*, in general wards, and by the barrier, cubicle, and open-air systems), of the temporary use of isolation hospitals for cases of pulmonary tuberculosis, of the nature of floor materials, of methods of heating and lighting, of temporary *v.* permanent buildings, etc.

It is suggested that the Local Government Board might sanction short loans for temporary hospitals, provided certain requirements as regards materials and details of construction were complied with.

The isolation hospitals of the following local authorities are described at length:—Acton U.D.C.; Bridport Town Council; Brighouse Joint Hospital Board; Colne and Holme Hospital Committee; Croydon Rural and Merton Joint Hospital (novel form of isolation block); Cuckfield R.D.C.; East Ham Town Council; Gloucester Town Council; Huddersfield Town Council; Kirkburton Isolation Hospital Committee (special convalescent rooms); Lydd Town Council; Newport (Mon.) Town Council; Nottingham Town Council ("open-air" system of treatment on verandahs and in open corridors); Penistone Isolation Hospital Committee; Rhondda Town Council; Settle R.D.C.; Chiddingstone Isolation Hospital Committee (ward-blocks of special design); Sevenoaks R.D.C.;

* Report on Isolation Hospitals, by H. Franklin Parsons, M D., being a Supplement to the Report of the Medical Officer of the Local Government Board for 1910–11. 149 pp., 8vo. London, 1912. Wyman and Sons. Price 1s. 7d.

Stroud Joint Hospital Board; Tonbridge R.D.C.; Tunbridge Wells, Tonbridge, and Southborough Joint Small-pox Hospital Board; Undercliffe Joint Hospital Committee; Waltham Joint Hospital Board (special design): Walthamstow U.D.C. (glass cubicles, and convalescent block of special design); West Ham Town Council (barrier system).

This report, like other work undertaken by Dr. Parsons, is characterised by thoroughness and completeness, and contains much valuable information and many suggestions which cannot fail to be of the highest utility to local authorities throughout the country.

The report has four appendices:—the first, the memorandum of the Local Government Board on the provision of isolation hospitals by local authorities; the second, a note by Dr. Theodore Thompson on the box system of isolation, as used at the Pasteur Institute Hospital and the Sick Children's Hospital, Paris; the third, a note by Dr. Parsons on the relative costs of isolation hospitals and lunatic asylums; and the fourth, a note by Mr. B. T. Kitchin, F.R.I.B.A., on the cost of isolation hospitals. P. B.

MEETINGS HELD.

Sessional Meetings.

London.—The meeting was held at the Institute on Tuesday, November 12th, at 8 p.m., when a Discussion on "The Report of the Departmental Committee on Intercepting Traps and House Drains," was opened by H. Percy Boulnois, M.Inst.C.E. (Chairman of the Council of the Institute). The chair was taken by Sir Maurice Fitzmaurice, C.M.G., M.Inst.C.E.

Owing to the large number of speakers, the meeting was adjourned, and the discussion was continued on Tuesday, November 19th.

Doncaster.—The meeting was held in the Mansion House on Saturday, November 23rd, at 11 a.m., when a Discussion on "Town Planning in relation to the Development of the South Yorkshire Coalfield," was opened by A. B. Dunne, M.B., D.P.H., M.O.H., Doncaster R.D.C. The chair was taken by Mr. H. Percy Boulnois, M.Inst.C.E. (Chairman of the Council of the Institute). The members were entertained to Luncheon by the Mayor and Corporation, and in the afternoon visited the Model Village of Woodlands.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, for Inspectors of Nuisances, in School Hygiene, including Elementary Physiology, and for Women Health Visitors and School Nurses, have been held at:—

Glasgow, October 25th and 26th. | Sheffield, November 1st and 2nd.
Newcastle, November 22nd and 23rd.

For Inspectors of Meat and Other Foods:—
Liverpool, November 15th and 16th.

At these Examinations 98 candidates presented themselves, and the following were awarded certificates:—

School Hygiene, including Elementary Physiology.

Briggs, Daisy.
Langley, Mary.
Oliver, Charles.
Sherburn, Emily.
Stevens, Esther Annie.
Taylor, Cecilia Hannah.
Walls, John.

Women Health Visitors and School Nurses.

Aitchison, Christina McInnes.
Benson, Violet Dryden.
Ross, Elizabeth Agnes.
Sadler, Winifred Mary.
Saunders, Margaret Wilson.
Speak, Jessie.

Inspectors of Nuisances.

Angus, William.
Berry, Margaret Mayman.
Bethell, Ruby Madelene.
Bill, Richard.
Brock, Alice Maria.
Cameron, William Henry.
Curr, Mitchell.
Elliott, Elspeth.
Gill, Herbert William.
Heslop, Thomas.
Hicks, John Evans.
Hirst, Robert Tom.
Knight, John Arthur.
Laverick, Robert Metcalfe.
Lawson, William.
Macdonald, Isabel Findlay.
McClure, Samuel.
McKellar, Robert.
McKendrick, John Dickie.
Metcalfe, Harold Robson.
Noble, Basil Henry.
Paxton, Thomas.
Ray, Florence.
Robson, Gilbert.
Routledge, Alfred.
Rowe, Arthur.
Simpson, Charles.
Straker, John.
Tayler, Harry.
Taylor, Alexandra Caldwell.
Thexton, Alexander.
Thompson, Thomas, Junr.
Turner, Walter.
Womphrey, Isaac Turner.

Inspectors of Meat and other Foods.

Bailey, Thomas Richmond.
Hodgkins, John Ronald, *Capt.*
Holden, Ralph.

FORTHCOMING MEETINGS.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, for Inspectors qualifying for Membership, for Inspectors of Nuisances, in School Hygiene, including Elementary Physiology, and for Women Health Visitors and School Nurses:—

London, December 6th and 7th. | Exeter, January 17th & 18th, 1913.
Preston, January 31st and February 1st, 1913.

For Inspectors of Meat and Other Foods:—

London, December 13th and 14th. | Grimsby, Feb. 14th & 15th, 1913.

Students' Lectures.

The Fifty-fourth Course of Lectures and Demonstrations for Sanitary Officers will commence on Monday, February 3rd.

Courses of Lectures on School Hygiene, including Elementary Physiology, and for Women Health Visitors and School Nurses, will commence on Monday, February 24th.

Course of Practical Training for Meat Inspectors will commence on Friday, February 14th.

The Special Course on Food and Meat Inspection, arranged for Army Officers and Professional Men, will commence on Monday, April 7th.

Congress and Exhibition, 1913.

The Right Hon. Earl Fortescue (Lord Lieutenant of the County of Devonshire) has consented to act as President of the Twenty-eighth Congress and Exhibition of the Institute, to be held at Exeter by invitation of the City Council from July 7th to 12th, 1913.

The Public Meeting to inaugurate the local arrangements will be held in January.

COLONIAL MEETINGS.

South African Branch Congress, 1912.

The Second Congress of the South African Branch of the Institute is to be held in Johannesburg in December. Full particulars can be obtained from the Hon. Secretary of the Branch, Prof. A. E. Snape, South African College, Cape Town.

Calendar for December, 1912, and January, 1913.

As far as at present arranged.

DECEMBER.

6 F. Lecture—Meat Inspectors' Course, at 7 p.m., by W. G. Barnes, M.R.C.V.S.
6 F. } Examinations—London.
7 S. }
7 S. Demonstration—Meat Inspectors' Course, at 2.30 p.m., by W. G. Barnes, M.R.C.V.S.
13 F. } Examination for Inspectors of Meat and other Foods—London.
14 S. }
Johannesburg—Second Congress of the South African Branch.
25 W. Christmas Day } Office, Museum, and Library closed.
26 Th. Bank Holiday }

JANUARY, 1913.

17 F. } Examinations—Exeter.
18 S. }
31 F. }
Feb. } Examinations—Preston.
1 S. }

LIST OF FELLOWS, MEMBERS, AND ASSOCIATES

ELECTED NOVEMBER, 1912

FELLOWS.

Reg. No.	Date of Election.	
2216	1907.	COUTTS, Francis James Henderson, M.D.VICT.,
	F 1912. Nov.	D.P.H., B.SC.(PUB. HEALTH), F.C.S., "*Rusland*," *Gloucester Road, Kingston Hill, Surrey.*
3063	1911.	DUNLEATH, The Right Hon. Lord, D.L., J.P., *Ballywalter Park, Co. Down.*
	F 1912. Nov.	
1035	1897.	HINDLE, Arthur, M.INST.C.E., 46, *Abingdon Street, Blackpool.*
	F 1912. Nov.	
2151	1906.	PEARSE, Thomas Frederick, M.D., F.R.C.S., M.R.C.P.,
	F 1912. Nov.	D.P.H.CAMB., *Municipal Offices, Calcutta, India.*
3008	1911.	SOPER, George Albert, B.S., A.M., PH.D., M.AM.SOC.
	F 1912. Nov.	C.E., 17, *Battery Place, New York, U.S.A.*
1157	1898.	STOTT, Hugh, L.R.C.P., M.R.C.S., D.P.H., L.S.A., 23,
	F 1912. Nov.	*School Hill, Lewes, Sussex.*
2312	1907.	TWEEDY, Sir John, F.R.C.S., LL.D., 100, *Harley*
	F 1912. Nov.	*Steeet, W.*
2607	1909.	WHITE, W. Henry, F.R.I.B.A., 14A, *Cavendish*
	F 1912. Nov.	*Place, W.*

MEMBERS.

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

M Marked thus have passed the Examination of the Institute for Inspectors of Meat and Other Foods.

* Marked thus have passed the Examination of the Institute in Sanitary Science as applied to Buildings and Public Works.

Reg. No.	Date of Election.	
3317	1912. Nov.	ARORA, Alakh Behari, B.A., D.P.H.CANTAB., L.R.C.P. & S.EDIN., *c/o Messrs. Thos. Cook & Son, Ludgate Circus, E.C.* (*Saharanpur, U.P., India.*)
3333	1912. Nov.	*ACTON, W. B., *Mount Pleasant, Wilmslow, Ches.*
3318	1912. Nov.	BANERJI, Raj. Cumar, M.D., *Medical Advisor to H.H. Prince Scindhia, Gwalior, India.*
3319	1912. Nov.	BHAGAT, Surendra Singh, B.SC.(ENG.)GLASG., *c/o Messrs. Thos. Cook & Son, Ludgate Circus, E.C.* (*Narayan Bhavan, Rawal Pindi, Punjab, India.*)
3320	1912. Nov.	‡*M* BURR, Percy Beard Frank, *Chief Sanitary Inspector, Ipoh, Perak, Federated Malay States.*
3321	1912. Nov.	CATTLIN, Osmond, ASSOC.M.INST.C.E., P.A.S.I., *Municipal Offices, High Holborn, W.C.*
3322	1912. Nov.	CHANDRASEKHARIAH, Yagavakata L., A.I.S.E., *P.W.D. Officer, Malvalli, Mysore, India.*
3323	1912. Nov.	‡CHILVERS, George Belson, M.I.MUN.E., *Engineer and Surveyor, County Offices, Oundle, Northants.*
3324	1912. Nov.	CRAIG, Robert Davidson, *Metropolitan County Board, Adelaide, South Australia.*
3338	1912. Nov.	DICKSON, John Rhodes, M.B., C.M.EDIN., D.P.H., *Port of Spain, Trinidad, B.W.I.*

3325 1912. Nov. ‡Egglestone, William Morley, *Dales House, Stanhope S..O, Co. Durham.*

3326 1912. Nov. Fee, David A., *Pebble Lodge, Holywood, Co. Down, Ireland.*

3327 1912. Nov. Macdonald, Ronald St. John, B.A., M.D.(McGill), D.P.H. *Hygiene Dept., McGill University, Montreal, Canada.*

3331 1912. Nov. *Manson, Jeremiah Leask, 27, *Stretton Road, Leicester.*

3328 1912. Nov. Martin, Antony Alexander, M.D.Lond., B.S., M.R.C.S., L.R.C.P., D.P.H., 15, *Victoria Place, Eastbourne.*

3329 1912. Nov. Mitchell-Withers, J. B., F.R.I.B.A., 73, *Surrey Street, Sheffield.*

3335 1912. Nov. *Parhawk, Kundan Lall, *near Karmon's Mosque, Ludhiana, Punjab, India.*

3330 1912. Nov. Porter, Joseph Francis, M.D., J.P., M.R.C.S., (*M.O.H.*), *Helmsley, Yorks.*

3336 1912. Nov. *Priestley, George, *Gladstone Street, Stainland, near Halifax.*

3337 1912. Nov. *Trusler, Charles Henry, 42, *Elliott Road, Calcutta, India.*

3331 1912. Nov. Wilkinson, Stanley, Assoc.M.Inst.C.E., *The Falm, Broomfield Road, Surbiton.*

3332 1912. Nov. Yeates, William, L.R.C.P.Edin., L.R.C.S.Edin., L.F.P. & S.Glasg. (*Deputy School M.O.*), *Kensington, Bishop Auckland, Durham.*

ASSOCIATES.

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

M Marked thus have passed the Examination of the Institute for Inspectors of Meat and Other Foods.

S Marked thus have passed the Examination of the Institute in School Hygiene, including Elementary Physiology.

V Marked thus have passed the Examination for Women Health Visitors and School Nurses.

Reg. No. Date of Election.

5911 1912. Nov. ‡Andrew, William E., "*Craigmore*," *Lansdowne Circus, Leamington Spa.*

5912 1912. Nov. *M*‡Balchin, Walter Edmund, 5, *Lansdowne Road, Hounslow, W.*

5913 1912. Nov. ‡Bayne, Kenneth Stuart, 40, *Maple Street, Bracebridge, Lincs.*

5914 1912. Nov. ‡Brearey, James, *The Avenue, High Legh, Knutsford, Cheshire.*

5915 1912. Nov. ‡Brodie, Bernard Vincent, 1, *Alexandra Mount, Litherland, Liverpool.*

5916 1912. Nov. ‡Buxton, Harold, *Louise Street, Gornal Wood, near Dudley, Staffs.*

5917 1912. Nov. *S*Cheevers, Miss Florence, *The Bronte Hall Training College, Leeds.*

5918 1912. Nov. *V*Curtis, Mrs. Elizabeth Hallawell, 400, *Park Road, North, Birkenhead.*

5349 1912. Nov. ‡Dawson, Miss Ellen, *c/o Mrs. Squance, 15, Grange Crescent, Sunderland.*

5350 1912. Nov. ‡Evans, Miss Eleanor Agnes, *Norfolk Villa, Harlow, Essex.*

5351 1912. Nov. ‡Forster, Fred, 99, *Legh Street, Golborne, Lancs.*

5352 1912. Nov. ‡Hargrave, Ernest Leslie George, *c/o Municipality, Pretoria. (c/o Dr. Hargrave, 32, Spital Square, E.C.)*

5353 1912. Nov. ✓Holmes, Miss Amy Elizabeth, 57, *Psalter Lane, Sheffield, Yorks.*

5354 1912. Nov. ✓Holt, Miss Carrie, *Warnford Villa, Wherwell Road, Guildford.*

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ACADEMIES (BRITISH).

London. *Lister Institute of Preventive Medicine.* Collected Papers. No. 8. Part I., Bacteriological, Pathological, and Epidemiological Papers. Part II., Physiological, Zoological, and Biochemical Papers. 8vo. London, 1911–12. *The Institute.*

——— *Royal Institute of British Architects.* Kalendar, 1912–13. 490 pp., 8vo. London, 1912. *The Institute.*

ACADEMY (COLONIAL).

Bombay Improvement Trust. Administration Report for Year ending 31st March, 1912. 130 pp., fcp. Bombay, 1912. *The Trust.*

ACADEMIES (FOREIGN).

Amsterdam. *Royal Academy of Sciences.* Proceedings of the Section of Sciences. Vol. XIV., 1st and 2nd Parts. 1,224 pp., 8vo. Amsterdam, 1912.

——— *Koninklijke Akademie van Wetenschappen te Amsterdam.* Verslag van de Gewone Vergaderingen der Wis-en. Natuurkundige Afdeeling. Van, 27 Mei, 1911; Tot, 25 November, 1911. Deel XX., 1st Gedeelte, Van, 30 December, 1911; Tot, 26 April, 1912. Deel XX., 2de Gedeelte. 1,428 pp., 8vo. Amsterdam, 1912.

——— Beiträge Zur Studium des Centralnerven—systems der Wirbelthiere, von Dr. Paul Röthig. 23 pp., 8vo. Amsterdam, 1912. *The Academy.*

Paris. *Prefecture du Département de la Seine.* Notes a L'appui du Compte des Recettes et des Depenses, de l'Exercice, 1911. 356 pp., 8vo. Paris, 1912. *The Department.*

Ghosh, *B. N.,* *and* **Das,** *Jahar Lal.* A Treatise on Public Health. 378 pp., 8vo. Calcutta, 1912. *The Authors.*

Ledingham, *J. C. G., M.B., D.Sc.,* *and* **Arkwright,** *J. A., M.D.* The Carrier Problem of Infectious Diseases. 319 pp., 8vo. London, 1912. *The Publisher (E. Arnold).*

Legge, *T. M., M.D., D.P.H.,* *and* **Goadby,** *K. W., M.R.C.S.* Lead Poisoning and Lead Absorption. 308 pp., 8vo. London, 1912. *The Publisher (Edward Arnold).*

Local Government Board. Report by Dr. G. W. Monier Williams on the Nature of the Colouring Matter of Flour, and its relation to Processes of Natural and Artificial Bleaching. Food Reports, No. 19. 9 pp., 8vo. London, 1912.

——— Dr. W. W. E. Fletcher's Report upon the Sanitary Circumstances and Administration of the Newport Pagnell Rural District. No. 72. 15 pp., 8vo. London, 1912. *A. Newsholme, M.D., F.R.C.P.*

Meade, *T. de Courcy, M.Inst.C.E.* The Ventilation of Sewers. 16 pp., 8vo. London, 1912. *The Author.*

MEDICAL OFFICERS OF HEALTH AND OTHER SANITARY REPORTS.

Aberdeen, August and September, 1912 *Matthew Hay, M.D.*
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New South Wales. *Department of Labour and Industry.* Report on the working of the Factories and Workshop Act, Minimum Wage Act, Early Closing Act, Shearer's Accommodation Act, etc., during 1911. 61 pp., fcap. Sydney, 1912. *C. J. Alderdice (Clerk to the Department).*

Scotland Registrar General. Report of the Twelfth Decennial Census, 1911. Vol. I., Part 20. County of Inverness. 74 pp., fcap. Vol. I., Part 21. County of Kincardine. 43 pp., fcap. Vol. I., Part 22. County of Kinross. 29 pp., fcap. Vol. I., Part 23. County of Kirkcudbright. London, 1912. *J. Patten Maclougall (Registrar-General).*

Sills, *Spenser.* Common-sense Homes. 168 pp., 8vo. London, 1912. *The Author.*

Thomson, *G., M.A., M.Inst.C.E., F.R.S.E.* Modern Sanitary Engineering. Part I., House Drainage. 256 pp., 8vo. London, 1912. *The Author.*

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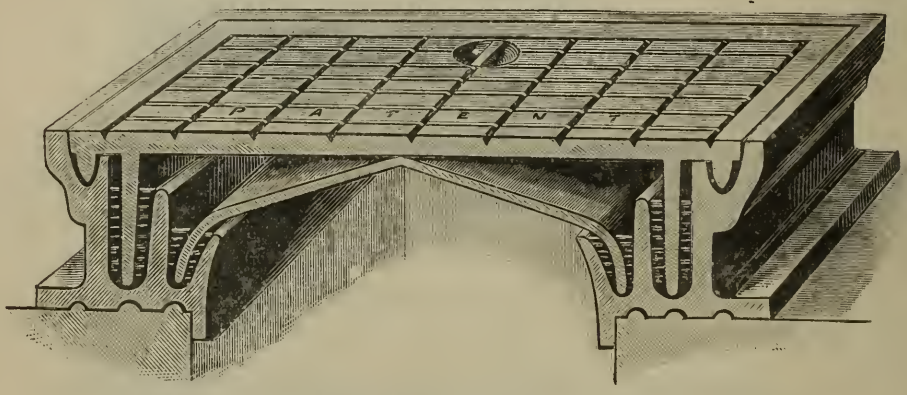

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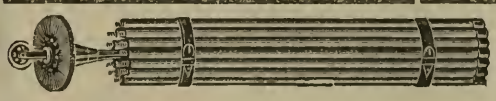

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